A DISSERTATION ON

"A STUDY ON STOMAS IN EMERGENCY LAPAROTOMIES"

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Branch – I

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CERTIFICATE

This is to certify that the dissertation entitled "A STUDY ON STOMAS IN EMERGENCY LAPAROTOMIES" is a bonafide original work of

Dr. R. SETHU KANNAN., in partial fulfilment of the requirements for M.S.Branch– I (General Surgery) Examination of the Tamil Nadu Dr. M.G.R. Medical University to be held in APRIL 2016 under my guidance and supervision in 2014-15.

Prof.Dr.A.RAJENDRAN, M.S
Professor of General Surgery,
Guide and supervisor
Institute of General Surgery,
Madras Medical College,
Rajiv Gandhi Government
General Hospital
Chennai – 600003.

Prof.Dr.P.RAGUMANI. M.S
Director and Professor
Institute of General Surgery
Madras Medical College,
Rajiv Gandhi Government General Hospital
Chennai - 600003

Dr.R. VIMALA, M.D,
Dean
Madras Medical College &Rajiv Gandhi Government General Hospital,
Chennai-600003

DECLARATION

I hereby solemnly declare that the dissertation titled "A STUDY ON STOMAS IN EMERGENCY LAPAROTOMIES" is done by Me at Madras Medical College & Rajiv Gandhi Govt. General Hospital, Chennai during 2014-15 under the guidance and supervision of Prof.Dr.A.RAJENDRAN, M.S. The dissertation is submitted to The Tamilnadu Dr.M.G.R. Medical University, Chennai towards the partial fulfillment of requirements for the award of M.S. Degree (Branch-I) in General Surgery.

Place:
Date:

DR.R. SETHU KANNAN,
Post Graduate Student ,
M.S. General Surgery
Institute of General Surgery,
Madras Medical College,
Chennai-3.

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LIST OF ABBREVIATIONS

TB	- -	Tuberculosis
ATB	- -	Abdominal Tuberculosis
RIF	- -	Right Iliac Fossa
GI	- -	Gastrointestinal
USG	- -	Ultrasonogram
CECT	- -	Contrast Enhanced Computed Tomography
CXR	- -	Chest Xray
PPI	- -	Proto Pump Inhibitor

ABSTRACT

A STUDY ON STOMAS IN EMERGENCY LAPAROTOMIES

INTRODUCTION

Stoma is a surgically made intestinal opening on anterior abdominal wall. Its common forms include colostomy and ileostomy. Shock, marked blood loss, significant faecal contamination, associated injuries, time till presentation and multiplicity of injury are widely accepted factors favouring stoma formation than primary repair which leads to significant mortality and morbidity owing to friable tissue that cannot hold a suture. A trouble free stoma is a boon. A troublesome can bring about social, domestic and psychological upsets. The use of mechanical sutures, the dedication and skill of nursing staff and stoma therapies and improvement in colostomy appliances have helped to improve the quality of life of patients with a stoma.In the present study, an attempt was made to identify common indications and complications associated with intestinal stoma in a tertiary care set-up. This insight will help us decrease the problems associated with this commonly performed general surgical procedure.

AIMS & OBJECTIVES

1. To study the various etiologies for stomas in emergency laparotomies.
2. To find the commonest procedure performed and its relation with the cause.
3. To assess the post operative morbidity and mortality and its relation to cause and type of stoma done.

MATERIALS & METHODS

Its a prospective and retrospective observational study. Method of sampling was non-random, purposive. Those patients who had underwent emergency stomas were included in this study. Informed written consent was taken from the patients or their guardian willing to participate in the study. Detailed history was taken from the study group to establish proper diagnosis. Thorough physical examination was done in each case. Data collection sheets were filled in by the investigator himself. The operation procedure and related peroperative factors were observed directly and recorded in the data collection sheet instantly. After completing the collection of data it was compiled in a systematic way and analysed

RESULTS & DISCUSSION

In emergency setting, midline laparotomy to relieve the patient of his symptoms is the first goal. The common procedures performed included primary closure of perforation incase of small isolated perforations with not much contamination. Resection followed by either anastomosis or stomas was done in most of the patients with malignant obstruction or non viable or ischemic bowel. Even in those patients who had anastomosis, a covering stoma was placed as the healing process in these patients may be impaired.The prevalence of morbidity in these patients were similar to any group of patients undergoing emergency laparotomy. The age predilection of morbidity towards elderly people is mainly due to significant proportion of malignant closed loop obstructions in this age group. Presence of a systemic disease, poor general habitus, inadequate optimization all have known to increase the tendency to develop post operative morbidity and mortality. Overall, prognosis is good in patients provided with early intervention, intensive post operative management while ensuring proper psychological support

CONCLUSION

- Abdomen injuries due to blunt and penetrating trauma and acute bowel pathologies leading to peritonitis such as bowel perforations are the leading causes needing stoma.

- More the lag period from the onset of symptoms/trauma to theatre, more is the incidence of stoma as anastomotic leakage is more common in this group.

- Post operative patient education and counseling is of utmost importance as there is no hope for prior sensitization in emergency settings

- Adequate hydration, electrolyte correction, nutrition management and psychological support teams play a crucial role in bringing significant number of patients for reversal.

CHAPTER 1

INTRODUCTION

INTRODUCTION

1. BACKGROUND

Stoma is a surgically made intestinal opening on anterior abdominal wall. Its common forms include colostomy and ileostomy.History of STOMAS dates back to 1710 when Littre of Paris made first ventral colostomy for imperforate anus.1 After World War I a mortality rate of 60% due to primary repair of colonic injuries dropped to 30% in World War II due to the introduction of colostomy. Ileostomy gained popularity for ruptured appendix and appendicular abcess. Shock, marked blood loss, significant faecal contamination, associated injuries, time till presentation and multiplicity of injury are widely accepted factors favouring stoma formation than primary repair which leads to significant mortality and morbidity owing to friable tissue that cannot hold a suture.

The number of abdominal stomas made each year is declining in UK and West where indications for faecal diversion include inflammatory bowel disease, familial adenomatosis polyposis, colorectal cancer, non gastrointestinal obstructing tumors, pelvic sepsis, trauma, diverticulitis, fistula, ischemic bowel disease, radiation enteritis, pseudomembranous enterocolitis , fecal incontinence and paraplegia but in developing countries it is still a common occurring for infective etiologies. Stoma actually serves the purpose of decompression, lavage, diversion and exteriorization in the set of odds and can be temporary or permanent. Major

indications of ileostomy include diffuse bowel pathology that precludes primary anastomosis like gross peritonitis, intestinal obstruction, radiation enteritis, ischemia and inflammatory bowel diseases and rectal causes. Colostomy is made in colonic obstruction (primarily due to cancer of distal colon / rectum), perforation with peritonitis, recto-vaginal fistulas and perianal sepsis.

Stoma formation causes social, domestic and many physiological upsets. But after the indulgence of stoma therapist and better nursing case and better stoma appliances alleviated these problems to greater extent and improved the quality of the patient's life. Stoma has various complications like bleeding, retraction, prolapsed, parastomal hernia and stenosis.

Bleeding is one of the most common complications which usually occur from the margins of stoma or from the cutting muscles. Retraction of the stoma is the putting back of intestine into the abdomen. Prolapsed is protrusion of the gut from the stoma mouth. Parastomal hernia is the outward herniation of the portion of intestine from the side of the stoma. Stenosis is one of the rare and late complications in which lumen of the stoma become narrow due to fibrosis or tightening of the skin.

A trouble free stoma is a boon. A troublesome can bring about social, domestic and psychological upsets. Some studies have shown that patient's attitude and life style were not impaired, although others have suggested difficulties in as many as 45% of cases8. The use of mechanical sutures, the dedication and skill of nursing

staff and stoma therapies and improvement in colostomy appliances have helped to improve the quality of life of patients with a stoma

In the present study, an attempt was made to identify common indications and complications associated with intestinal stoma in a tertiary care set-up. This insight will help us decrease the problems associated with this commonly performed general surgical procedure.

1.2 OBJECTIVES

The purpose of this study is

1. To study the various etiologies for stomas in emergency laparotomies.
2. To find the commonest procedure performed and its relation with the cause.
3. To assess the post operative morbidity and mortality and its relation to cause and type of stoma done.

CHAPTER 2

REVIEW OF LITERATURE

REVIEW OF LITERATURE

2.1 DEFINITION OF OSTOMY

The term “ostomy” is derived from the Latin word “ostium,” which means mouth or opening. In the setting of abdominal surgery, the ostomy procedure refers to bringing a segment of small intestine or colon from the abdominal cavity out through the abdominal wall fascia and suturing it in place to the skin. By creating an opening in the bowel and suturing the bowel wall in place, the contents of the gastrointestinal tract can be safely drained into an ostomy appliance which is adhered to the skin.

Small bowel or colon may be used for this purpose. The name of the procedure reflects the segment of intestine used. For example, using colon creates a “colostomy,” and using ileum creates an “ileostomy.” Further, if the bowel is completely transected and a single portion of intestine is brought out of the abdomen, it is termed an “end” colostomy or end ileostomy. However, an intact loop of intestine can also be used. The bowel in this case is opened along its antimesenteric side, while preserving the remaining bowel wall, and both proximal and distal portions of the intestine are secured to the skin creating a “loop” ileostomy or colostomy.

2.2 TYPES OF STOMA

- *Ileostomy* - - ileum is projected out, on to the skin of abdominal wall to drain semi-liquid, faecal matter.
- *Jejunostomy* - - jejunum is brought out through the skin. Usually avoided as it has a high output and causes electrolyte imbalance
- *Colostomy*—colon at different levels, can be brought out to the skin as required as colostomy, to divert faecal matter.
- *Cutaneous ureterostomy*—cut ends of one or both ureters are apposed to the skin of abdominal wall.
- *Ileal urinary conduit*—segment of isolated ileum can be used to drain urine from the ureter as urinary ileal conduit. Ureters are anastomosed to a closed ileal conduit. Ileal stoma is brought out as stoma. Different types of continent ileostomies are in use to prevent leak, soakage and discomfort.
- *Vesicostomy*—it is done in children. Here anterior wall of bladder is brought out and bladder mucosa is sutured to the skin of abdominal wall

2.3 HISTORY OF STOMAS :

The history of stomas has its beginnings in biblical times, but the first purposeful creation of a stoma occurred slightly more than 200 years ago. In a relatively short time, thanks to many of the great pioneers in surgery and enterostomal therapy, the stoma has evolved from a hastily constructed, foul-smelling, and unsightly artificial anus covered with only moss and leaves and held in place with a crude leather strap to an odorless, barely noticeable, and often continent opening that may require no device whatsoever.

- In 1710 Alexis Littre´ (1658–1726) suggested the creation of an abdominal stoma for the treatment of imperforate anus after observations made during the autopsy of a 6-day-old infant.

- In 1793 Duret performed the first successful left iliac colostomy in the treatment of imperforate anus in a 3-day-old infant.

- Jean Zulema Amussat (1796–1856) considered the father of the lumbar colostomy - - demonstrated in a cadaver first before implementing in patients

- In 1820 Daniel Pring, a surgeon from Bath, performed a left iliac colostomy in the treatment of an obstructing rectal cancer, which made him the first English surgeon to successfully create an artificial anus

- In 1881 Schitzinger, and in 1844 O.W. Madelung described a procedure of creating a proximal “single-barreled” stoma while returning the distal closed loop to the abdominal cavity.

- The Mikulicz technique of intestinal anastomosis, described by Johann von Mikulicz- Radecki in 1903, solved the problem of stoma closure

- In 1907 Mayo et al. first described the use of the right transverse colostomy to “defunction” the sigmoid colon in the treatment of diverticulitis.

- In 1931, Hartmann described resection of the sigmoid colon and upper rectum, oversewing of the distal rectal stump, and creation of an end descending colostomy.

2.4 PHYSIOLOGY OF STOMAS :

Patients with properly function- ing stomas retain normal physiology except for some well-compensated changes in fluid and electrolyte homeostasis.

Ileostomy :

There appear to be three distinct phases of adaptation during the initial postoperative period following stoma construction. Ileostomy effluent during the first 1–3 days is bilious and liquid in nature, and each day the output increases. During the second phase, beginning between days 3 and 5, the output stabilizes or

decreases slightly. The third phase is characterized by steadily declining outputs until a steady state is reached 6–8 weeks postoperatively. Subsequently, a relatively constant stool volume rang- ing from 200–700 mL/day is expected when the ileostomy is well established.

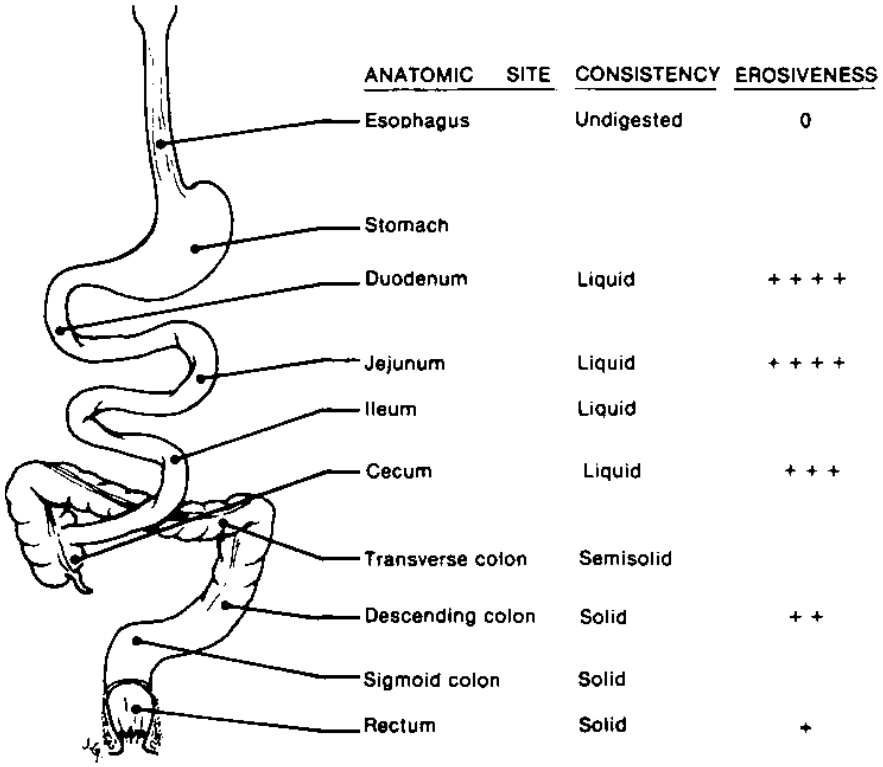


Fig 1. Physiology of Stoma Output

Colostomy :

When a colostomy first begins to function, the output is liquid. The liquid steadily increases in volume and is expelled on an irregular basis. After 10–14 days the consistency of the effluent becomes quite viscous. Slowly, a pattern of stool evacuation develops and the stool is expelled on a more predictable basis.

2.5 INDICATIONS

ABDOMEN INJURIES

Blunt injury abdomen can lead to compression of intra-abdominal organs against the vertebral column causing rupture of

- Solid organs
- Hollow organs
- Mesentery
- Detachment of gut from the mesentery

Open abdomen injuries can result in

- Hollow organs may perforate and infect the peritoneal cavity (due to contamination by the contents of the organ—feces, urine, intestinal or gastric contents), or bleed (either into the organ or outside or both).
- Solid organs cause hemorrhage (inside the organ or outside or both), and large bleeds cause shock and sometimes death.

INJURIES OF MESENTERY

Incidence and Etiology

- Mesentery consists of its arteries and veins and they may be injured by either penetrating or nonpenetrating abdominal trauma
- In most cases, associated organ injuries are found.

Symptoms

Depending on the size of the vessel lacerated, the rapidity of bleeding and associated organ injury, the patient will present with signs of shock, abdominal pain and distension.

Sign

On examination, tenderness is marked.

When the bleeding occurs within the layers of mesentery, the clinical signs evolve slowly and the viability of the bowel is threatened.

Relevant Investigations

Plain X-rays may show air under the diaphragm when the bowel is perforated by the injury

Peritoneal tap may be useful in establishing the bleeding.

Treatment

✓ Repair of the torn mesentery is required

✓ Resection and anastomosis/ stoma is required for nonviable intestine.

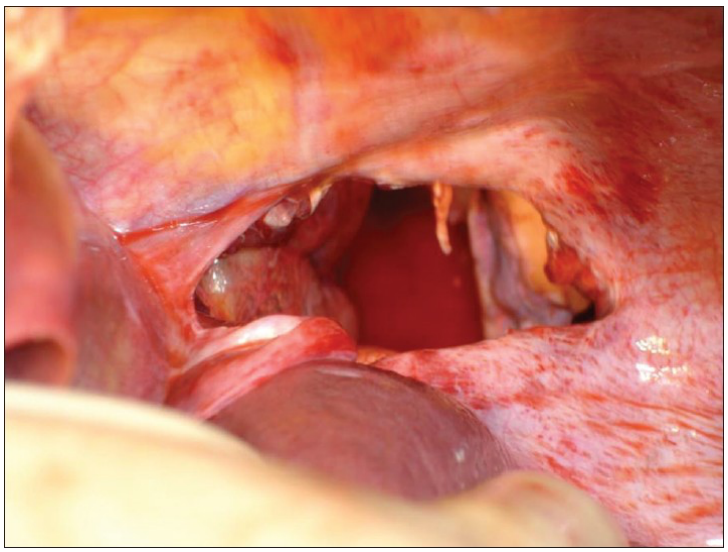


Fig 2. Mesentric Tear

INJURIES OF SMALL INTESTINE

Incidence and Etiology

✓ Injuries to the small intestine are more common than injuries to the duodenum and large intestine, the usual mechanism being the blunt trauma crushing the bowel against the vertebral column, more commonly the duodenojejunal flexure and the ileocecal junction, the fixed parts

✓ Blunt injuries cause slow necrosis of bowel and leak occurs late

✓ Signs and symptoms develop late—2 to 3 days later, depending on the size of the damage and leak of contents

✓ Penetrating injuries can also cause small bowel trauma, but less commonly, probably due to its sliding away from a knife because of its great mobility

✓ Associated mesenteric tears are common.

Clinical Presentation

Abdominal pain, distension and vomiting

Tenderness and guarding are pronounced around the damaged bowel and the patient may point it (Pointing sign).

Relevant Investigations

Plain X-rays may show air under the domes of the diaphragm

Paracentesis will show bile-stained fluid.

Treatment

Simple suturing is done for simple tears

Resections and stomas are required for large tears with nonviable bowel

Peritoneal toileting is mandatory under cover of antibiotics.

INJURIES OF LARGE INTESTINE

Incidence and Etiology

Large bowel injuries can be caused by penetrating and nonpenetrating injuries. Ruptures may be:

- Extraperitoneal for ascending and descending colon injuries, whereas
- Intraperitoneal, when the injuries are of transverse and sigmoid colons
- Patient develops septic complications quickly as the large fluid leak is fecal and infected
- Delayed presentation is not uncommon as in small bowel injuries

Symptoms

Abdominal pain, vomiting and distension

High grade fever occurs due to fecal contamination.

Signs

Signs of peritonitis.

Relevant Investigations

Plain X-rays may show air under the domes of the diaphragm (intraperitoneal ruptures)

Paracentesis will show feculent fluid.

Treatment

Early laparotomy is required

Closure of tears with proximal diversion is necessary

Peritoneal toileting is mandatory under cover of broad-spectrum antibiotics.

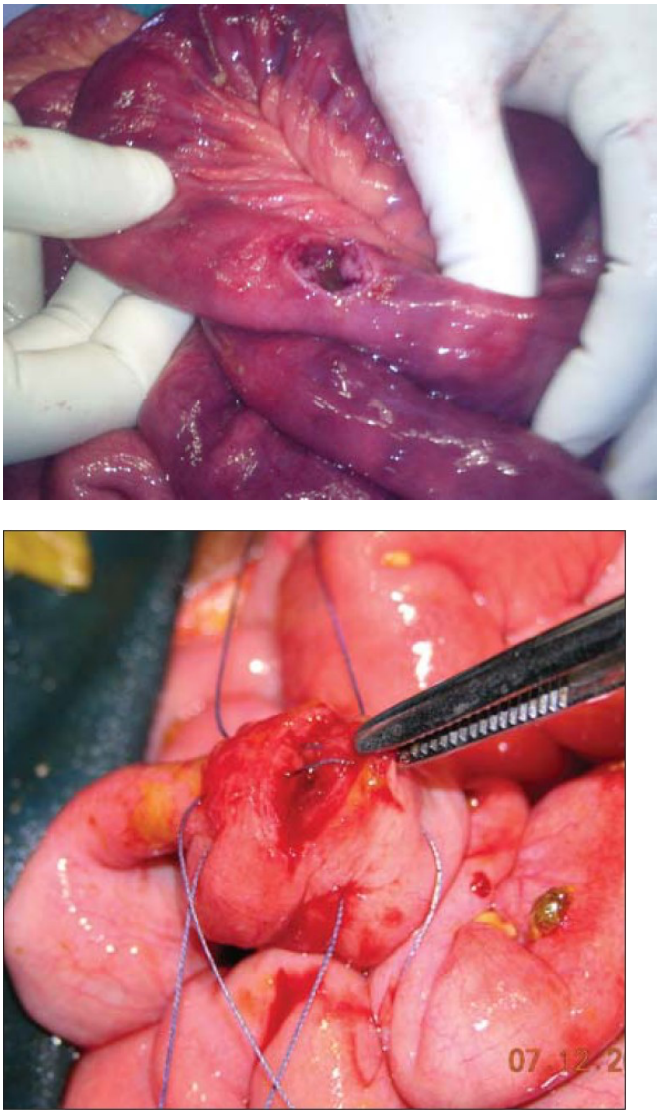


Fig 3. Post Traumatic Bowel Perforation

ACUTE ABDOMEN

ACUTE GI PERFORATION

Causes and features

• Duodenal ulceration.

• Gastric ulceration (usually anterior prepyloric; less commonly anterior body).

• Gastric carcinoma.

• Jejunal Perforations

• Ileal Perforations - - due to infections like typhoid or TB, non specific causes

• Colonic Perforations - - Following diverticulitis or following malignancy

Symptoms

• Acute onset upper abdominal pain. Severe, constant, worse with breathing and moving; may radiate to back or shoulders.

• Prodrome of abdominal pain (in benign or malignant ulceration).

• Copious vomiting and abdominal distension

• Prodrome of weight loss, dyspepsia, and anorexia suggests carcinoma.

• Prodrome of fever may indicate infective etiology

Signs

• Generalized peritonism common (board-like rigidity with marked guarding and tenderness).

• Localized upper abdominal peritonism may occur, especially with previous surgery where adhesions may act to contain the contamination.

• Mild fever, pallor, tachycardia, and hypotension (often profound due to autonomic reaction); typically respond quickly to modest fluid resuscitation.

Emergency management

Resuscitation

• Establish large calibre IV access; give crystalloid fluid up to 1000mL if tachycardic or hypotensive.

• Catheterize and place on a fluid balance chart.

• Send blood for FBC (Hb, WCC), U&E (Na, K), LFTs (albumin), group and save, clotting.

Establish a diagnosis

• Erect CXR (looking for free gas). If the CXR is non-diagnostic, a lateral decubitus abdominal f lm can be performed, although a CT is more common.

• CT scan if diagnosis unclear on CXR; may demonstrate presence of gastric carcinoma.

Early treatment

• Once the diagnosis of perforation is confirmed on clinical or radiological grounds, the treatment is surgical unless:

• The patient declines.

• The patient is considered unlikely to survive and supportive care is deemed more appropriate.

• Conservative management. IV PPI, limited oral intake, active physiotherapy—has a very limited role in management; it offers an outcome similar to that of surgery only in cases where the perforation has sealed at the time of presentation, there is no haemodynamic instability, and there are no signs of peritonism.

Definitive management

➡ Resection and Anastomosis with defunctioning stoma

➡ Resection with double barrelled stoma

➡ Loop ileosotomy or colostomy

➡ End ileostomy or colostomy

ACUTE INTESTINAL OBSTRUCTION :

Intestinal obstruction still is a challenging, commonly acute condition in surgical practice. *Adhesions* are becoming the more common cause of intestinal obstruction than hernia nowadays. Common causes for adhesions are gynaecologic surgeries, appendicectomy, colonic and pelvic surgeries. 20% cases of intestinal obstruction are due to malignancy or its peritoneal *carcinomatosis* spread. More than 50% of intestinal obstruction in western countries are due to adhesions; 20% due to malignancies; 10-15% due to hernias. Crohn's disease is also becoming a common cause of obstruction.

Obstruction may be external/internal; partial (incomplete or subacute)/ complete; acute/acute on chronic/or chronic; simple/closed loop/strangulation; congenital/acquired; proximal/distal. Earlier, hernia was the commonest cause of intestinal obstruction. Now adhesions (40%) are the commonest cause especially in developed countries and hernia being 15-25% common. In developing countries both adhesions and hernia are the common causes of intestinal obstruction.

Eighty per cent of intestinal obstruction occurs in small bowel; 20% in colon. 70% of colonic obstruction is due to malignancy. Other 30% is due to volvulus; diverticulitis, inflammatory cause like tuberculosis, etc. Mortality is 3% in obstruction without strangulation; 30% in obstruction with strangulation.

Acute Intestinal Obstruction can be dynamic or adynamic. There are multiple ways in which acute intestinal obstruction can be classified. Depending on site of obstruction it can be classified as follows :

	Proximal Small Bowel	**Distal Small Bowel**	**Large Bowel**
Site of Obstruction	*Duodenum & Jejunum*	*Ileum*	*Anywhere*
Causes	Congenital Lipomas Leiomyomas Malignancy Bands and adhesions	Tuberculosis strictures Malignancy Crohn's Gallstones Hernias— common cause Roundworm Congenital	Malignancy Tuberculosis stricture Anorectal malformation Volvulus Congenital megacolon Bands
Clinical Features	Severe vomiting, dehydration, no or less distension, colicky pain	Severe vomiting, dehydration, no or less distension, colicky pain	Constipation, distension— early; Late vomiting less pain
Plain X Ray	Valvulae conniventes	Characterless Central Fluid Level	Dilatation with haustration

Fig 4. Intestinal Obstruction

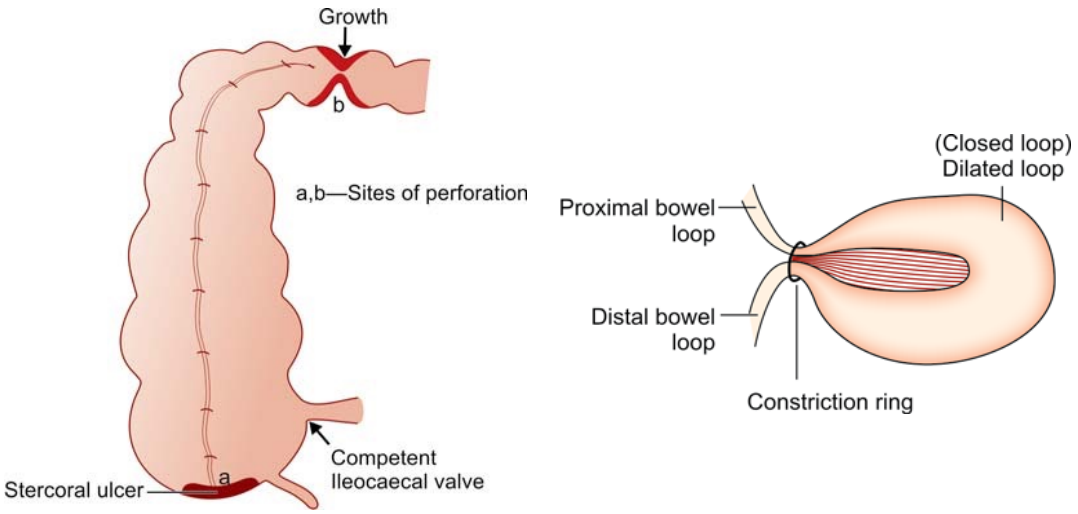


Fig 5. Closed Loop Obstruction

Investigations :

Plain X-ray abdomen: (initially supine abdominal X-ray is taken; later if needed X-ray in erect posture is taken if perforation is suspected).

Multiple air-fluid levels.

Proximal the obstruction → Lesser the air fluid level.

Distal the obstruction → More the air fluid level.

Normally, *three fluid levels can be seen* in plain X-ray film—at fundus of stomach, at duodenum and often at caecum.

Jejunum shows *concertina effect* due to *valvulae conniventes (Herring bone pattern)—by the valves of Kerckring.*

Ileum is smooth and characterless (by Wangensteen).

Large bowel shows *haustration.*

Pneumobilia (gas in biliary tree) may be due to gall-stone ileus.

Distended caecum is shown as round gas shadow in the right iliac fossa. Dilated caecum signifies large bowel obstruction.

Small bowel > 3 cm diameter; proximal large bowel > 9 cm; transverse colon > 5.5 cm; sigmoid colon > 5 cm are suggestive of intestinal dilatation. But this increased diameter need not suggest intestinal obstruc- tion everytime.

Barium (microbarsolution) enema or gastrografin contrast enema X-ray is useful in intussusception. [*Barium meal is usually contraindicated in acute intestinal obstruction*. However dilute (micro bar) barium meal/gastrografin meal follow through X-ray may be done with caution in suspected subacute/partial intestinal obstruction under fluoroscopy, otherwise it may precipitate complete obstruction or may cause perforation and barium peritonitis which is very dangerous].

o Haematocrit,bloodureaandserumcreatinine;arterialblood gas analysis (acidosis is common), LFT, platelet count (In severe sepsis there will be altered LFT with thrombocyto- penia).

o Serum electrolytes estimation. Hypokalaemia is common. o Total count is increased. But can be significantly low in severe stage of sepsis.

o Estimation of serum Dlactate, CPK–B Bisoenzyme, intestinal fatty acid binding protein are different investigations may be useful to predict bowel ischaemia/ gangrene.

o *US abdomen* is useful to see dilated bowel and fluid in the peritoneal cavity. It is better than X-ray but not as good as CT scan. It has got 95% sensitivity; 80% specificity; 80% accuracy. Doppler US is useful in detecting strangulation.

o *CT scan* is very reliable investigation for intestinal obstruction. It has got 93% sensitivity; 94% accuracy and 100% specificity. In CT scan small bowel loop > 2.5

cm suggests dilatation. It can show dilated loop, transition zone and collapsed part which are definitive features of intestinal obstruction. It can also give idea of changes in the bowel wall, ischaemia, strangulation, mesenteric oedema and thickening. It also shows *bowel wall gas, portal venous gas* and mass lesion.

o Basic electrical rhythm of small bowel will be changed in ischaemia. It can be determined by noninvasive method using *superconducting quantum interference device (SQUID).*

Treatment :

Nasogastric aspiration: To reduce toxic effects, to reduce bowel distension which indirectly improves pulmonary ventilation and to reduce possibility of aspiration pneumonia.

o *Replacement of fluid and electrolytes*.

o *Antibiotics:*Ampicillin,gentamycin,metronidazole,cephalosporins.

o *Blood transfusion*: FFP or platelet transfusions are often needed in critical patient.

o *ICU critical care*: Systemic management of complications like ARDS, DIC, SIRS are important. If there is hypotension, dopamine/dobutamine are also needed.

o *CVP for fluid and monitoring*: PCWP (pulmonary capillary wedge pressure) monitoring are often needed in haemodynamically unstable patient.

o *Surgery*:

Immediate laparotomy is done and the site (by finding the junction of dilated proximal and collapsed distal bowel) and cause of the obstruction is identified. The obstruction is relieved.

Warm saline soaked mop is placed over the doubtful area with 100% oxygen inhalation for 20 minutes; if colour becomes normal with peristalsis then bowel is viable. *On table Doppler* study may be useful. Fluorescein fluorescence study may be helpful on table to check the viability. If bowel is not viable *resection and anastomosis is done.* A good peritoneal wash is given and the abdominal cavity is drained. Abdomen is closed in layers using non absorbable sutures (polyethylene, polypropylene, nylon). Often tension sutures are required.

In case of right-sided colonic obstruction, right hemi- colectomy with ileocolic anastomosis is done. In case of *left-sided colonic* obstruction, *left hemicolec- tomy* (resection) and *colo-colic* anastomosis is done with a *defunctioning colostomy* (right-sided transverse) which is closed after 6 weeks. Obstruction due to *rectosigmoid* growth with patient being severely ill—*Hartmann's operation* can be done to save the life of the patient wherein distal stump after removal of the growth is closed, proximal colon is brought out as *end colostomy. Second look operation* may be needed in doubtful cases or multiple segment obstructions in 24-48 hours to confirm viability.

Laparoscopic approach may be useful in partial obstruction, proximal obstruction, obstruction due to band. Conversion when needed should be done without hesitation.

Acute postoperative obstruction is difficult to identify and manage. CT is very useful. Initially it is treated conservatively (90%), but suspected ischaemic cases or persistent obstruction becomes an indication for surgery. Resection with exteriorization may be the choice.

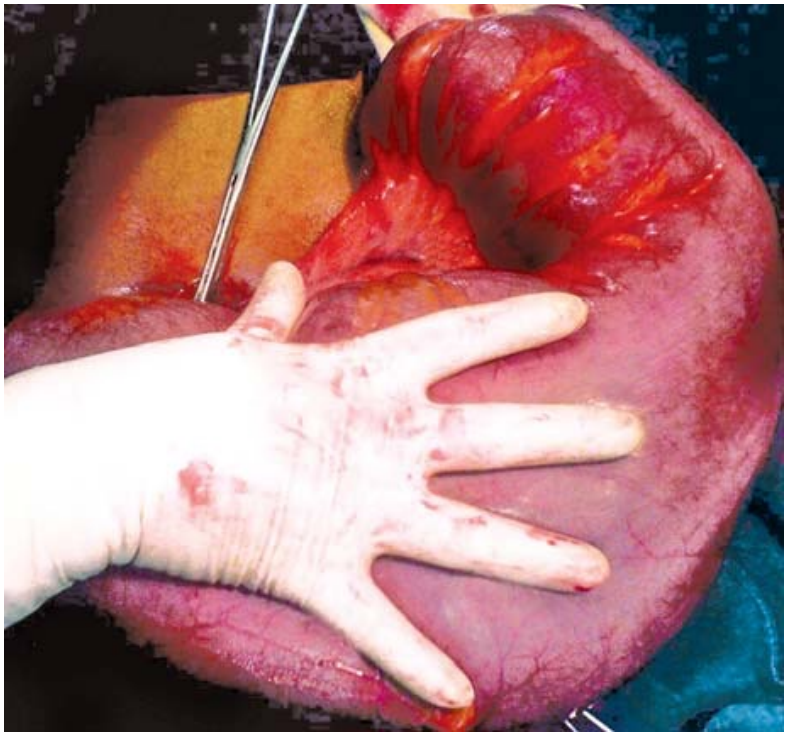


Fig 6. Sigmoid Volvulus

2.6 CREATION OF A STOMA

PREOPERATIVE PREPARATION

Creation of an ostomy has a profound effect on patients' lifestyle and quality of life. Therefore, thorough patient counseling preoperatively is essential to facilitate a smooth transition, both physically and mentally, to life with an ostomy. The location of the ostomy on the patient plays an important part in its overall function, and prior to the procedure, potential sites for ostomy placement should be marked on the abdominal wall. Often, this is performed by an enterostomal therapist or ostomy nurse. Factors to consider with placement include the patient's occupation, belt line, abdominal wall contour both sitting and standing, prior incisions, bony prominences, and abdominal girth. It should be easy to see and easily accessible to the patient. Skin folds and a pannus should be avoided due to difficulty with placement of the ostomy appliance. Stoma sites are also selected based on the segment of bowel to be utilized. Most end colostomies are located on the patient's left side in the left lower quadrant, whereas ileostomies are often in the right lower quadrant. The ostomy should be created through the rectus muscle to provide additional support. Most commonly, the ostomy is placed on the imaginary line from the umbilicus to the anterior superior iliac spine, through the rectus muscle, in either the right or left lower quadrant. However, if the belt line, skin folds, or pannus prevent easy access by the patient in this location, alternative

sites may be chosen. In elective operations, it may be helpful to have the patient wear an adhesive ostomy appliance for a few days prior to the procedure to ensure optimal placement.

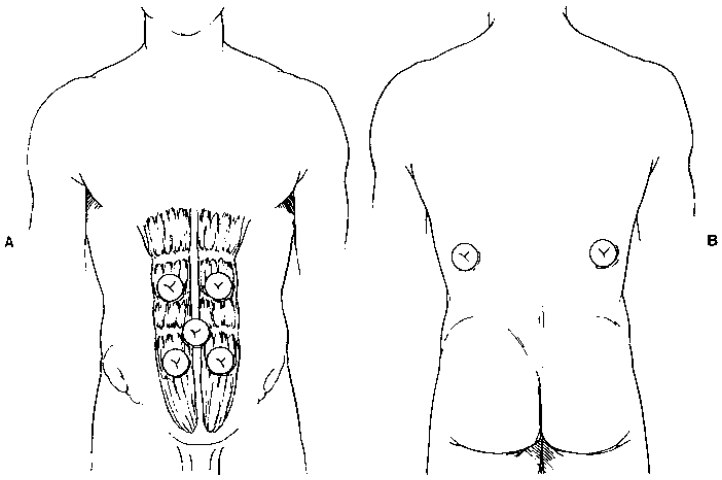


Fig 7. Anatomical Sites for Stoma

POSITIONING AND ANESTHESIA

Depending on the indication for the procedure, the patient may be either in supine or low lithotomy position. Patients who are having a bowel resection with a planned rectal anastomosis should be placed in low lithotomy, whereas operations for more proximal bowel pathology can be approached in the supine position. The abdominal incision and exposure is dictated by the indication for the operation and the segment of bowel to be mobilized.

DESCRIPTION OF THE PROCEDURE

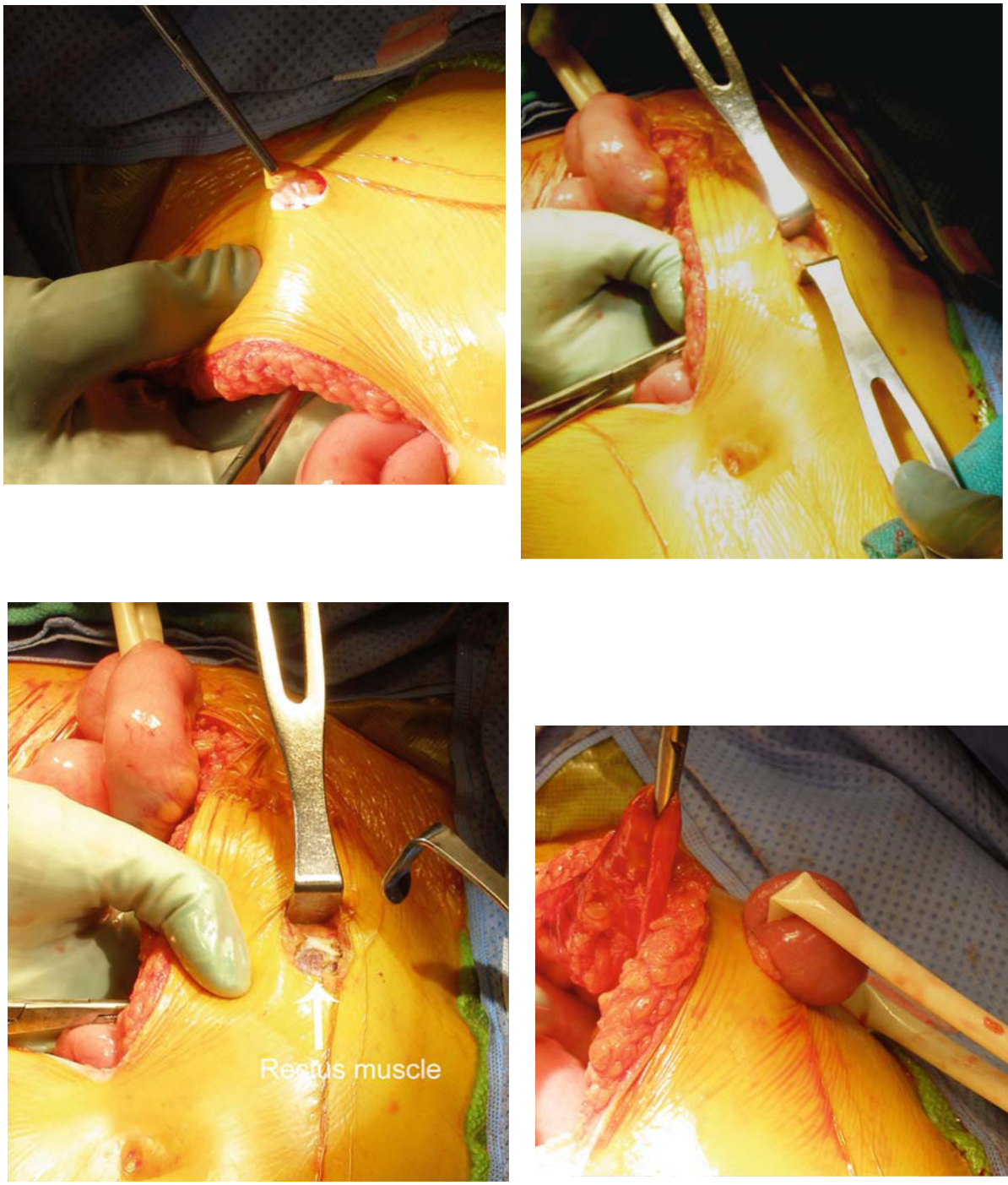
Often, creation of the ostomy is the final step in a lengthy operation. However, extreme care is required during this portion of the procedure due to the significant morbidity from a poorly functioning ostomy. The segment of bowel is mobilized up to the abdominal wall by freeing attachments of the peritoneum and lengthening the mesentery. Like any intestinal anastomosis, adequate blood supply, lack of tension, and avoidance of pre-existing infection are key principles in its construction. This may be difficult in cases of extreme obesity or a shortened, inflamed mesentry .

Once an adequate length of bowel has been mobilized, the ostomy begins with a circular skin incision measuring 2–4 cm in diameter at the pre-marked site. Placing pressure on the undersurface of the rectus with a folded gauze laparotomy pad in the opposite hand prevents damage to the underlying viscera.Using electrocautery, a disk of skin is excised, leaving some of the subcutaneous fat behind, which will serve to support the bowel at the abdominal wall and prevent retraction. Blunt retractors are used to retract the incision and subcutaneous fat, exposing the underlying anterior rectus sheath. Once the fascia is exposed, it is divided either vertically or with a cruciate incision. The rectus muscle is separated in the direction of its fibers with simple retraction and not divided. The posterior sheath is exposed. The posterior fascia and peritoneum are divided similarly with

electrocautery, with care to protect the underlying viscera. A general rule of thumb is that the defect in the fascia of the abdominal wall should admit two finger breadths, which allows adequate space for the bowel without vascular compromise. Very large fascial defects, which may be required for a loop colostomy for example, have a high rate of parastomal hernia formation.

While keeping a finger through the opening to preserve the tract, a Babcock clamp is carefully placed through the hole in the skin into the peritoneal cavity. The clamp is placed onto the bowel segment and bowel is gently pushed through the fascial defect, with care to avoid pulling the intestine and tearing the mesentery. For loop stomas, a Penrose drain passed adjacent to the bowel wall allows gentle traction during placement . The bowel should protrude 2–4 cm from the skin. At this point, the abdominal portion of the procedure is completed and the abdominal incision is closed, to avoid contamination when the bowel is re-opened during stoma maturation. The process of “maturing” the ostomy involves creating a spout with the bowel by everting the edges. This process was first described by Brooke and serves a number of important functions.

Fig 8. Creation of a Stoma



First, it helps direct the effluent into the appliance away from the skin, which is especially helpful for ileostomies, which produce highvolume output. The eversion technique also prevents stricture formation of the distal bowel and prevents leakage around the appliance. Next, the bowel is opened, either by excising the previous staple line (in the setting of an “end” ostomy) or opening the bowel primarily on the antimesenteric border for a loop ostomy. To properly evert the lumen, in the case of an end ostomy, three or four seromuscular absorbable sutures are then placed at each quadrant circumferentially around the bowel lumen.

Each suture begins inside-out through the lumen of the bowel including the mucosa and serosa. The next bite is seromuscular at the bowel wall where the abdominal skin and protruding bowel meet and the final bite is through the dermis. Each suture is tagged with a hemostat. To evert the edge, the blunt end of a forceps is placed along the bowel wall and tucked under the stitch. The suture is gently pulled tight and tied as the bowel everts over the forceps and slightly intussuscepts Once the corners are secure, simple interrupted sutures are placed evenly around the lumen, starting inside-out through the entire thickness of the bowel and into the dermis. A clear stoma appliance is then placed over the everted bowel.

Maturation of a loop ostomy follows similar principles, although it requires securing two bowel lumens to the abdominal wall instead of one. In addition, since the bowel is only partially transected, the posterior bowel wall remains intact. In

order to prevent this portion from retracting, a “bridge” may be used but is often not necessary. Usually made of a short segment of plastic or a rubber catheter, the bridge is passed under the intact bowel wall and secured in place with permanent sutures to further support the bowel. In cases of a loop colostomy where additional vascular division has been performed, the bridge must not occlude the marginal artery during placement. The bridge can usually be removed within 5 days of the operation.

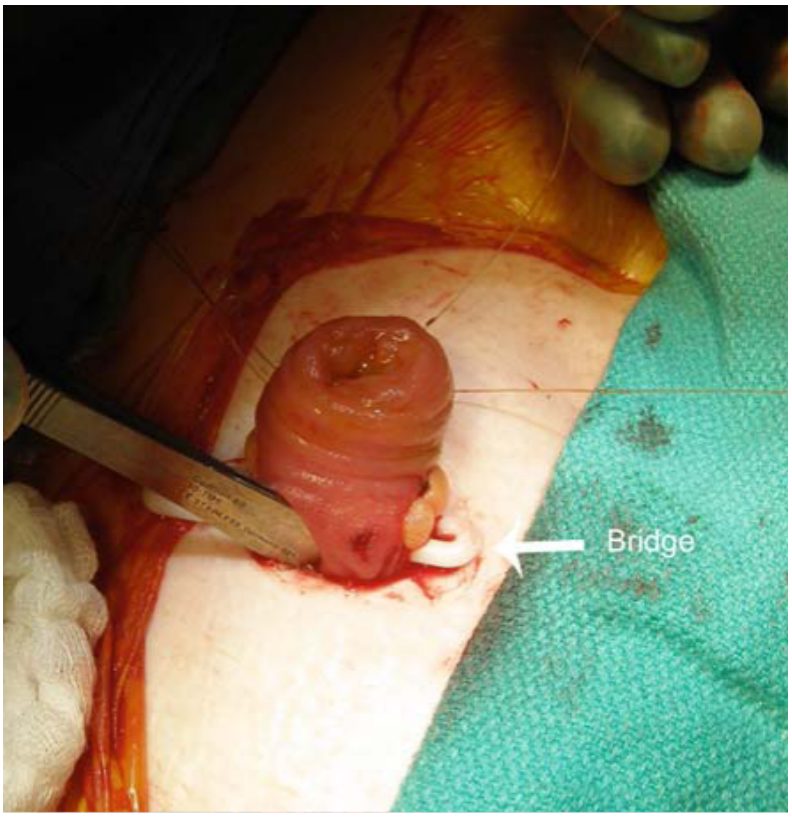


Fig 9. Ideal Stoma

2.7 POSTOPERATIVE CARE

A clear ostomy appliance is applied postoperatively to facilitate inspection of the bowel for viability. The objective of stoma construction is to provide an anatomically stable opening allowing placement of an ostomy management system that will maintain a seal of stool and gas for 4–7 days. If every abdomen were flat, muscular, and unscarred, placement of the stoma would not be a major problem. In reality, many patients have a protuberant abdomen and lax musculature. Often they have incision lines that were placed in different directions and have created creases and weak muscles from neurovascular interruption. Under these circumstances the time taken to plan the site for a stoma is crucial because it can minimize the number of postoperative problems. The output from the ostomy is directly related to the segment of intestine used. Left colon or sigmoid colostomies produce formed stool, whereas more proximal colostomies and ileostomies have a thin output consistency. It is not uncommon for ileostomy output to average 1–1.5 l per day, especially in the perioperative period. Patients should be carefully monitored for dehydration and fluid resuscitated as needed. Ileostomy output is also rather acidic (pH 6.3) and therefore, accurate sizing and secure appliance placement should be utilized to avoid skin irritation. Skin complications and dehydration are common postoperative sequelae and should be carefully assessed prior to patient discharge.

POUCHING SYSTEM PROCEDURES

General issues that must be considered in establishing pouching system procedures include the following: organizational matters, timing of pouch change, frequency of pouch change, and sizing of the pouch or barrier opening.

Timing of Pouch Change

Optimally, the pouch is changed when the stoma is not highly active. A fecal stoma is usually most active within 2 hr of a meal. For a urinary stoma, the best time for a pouch change is usually early in the morning, before fluid consumption. Each patient learns his or her own best time for pouch changes.

Frequency of Pouch Change

There is no "correct" frequency for pouch changes. The goal is to establish a routine schedule that prevents leakage and provides the individual with con- trol. The stoma that is appropriately sited and well constructed can usually be managed with a pouch change frequency of every 4–7 days. With more dura- ble products, some individuals can maintain secure seals for 10 days or even longer. Most clinicians recommend at least a weekly change to inspect the peristomal skin and prevent irritation. In contrast, with a poorly sited or re- tracted stoma, a twice-weekly pouch change may be required to prevent leak- age; occasionally daily or alternate-day changes may be required.

Establishment of the optimum frequency for pouch change requires individual adjustment and experimentation. In the immediate postoperative period, the pouch is changed more frequently than usual to permit stoma assessment and provide instruction in self-care procedures. After discharge, the patient should be encouraged to gradually extend the interval between pouch changes until optimum frequency can be determined. This frequency then becomes the basis for routine pouch changes. The patient is also taught to recognize the signs of undermining and impending leakage (i.e., itching or burning of the peristomal skin, odor noted when the pouch is closed, or visible "meltdown" of the skin barrier) and to change the pouch promptly whenever any of these signs are present.

Sizing of Pouch or Barrier Opening

Most manufacturers of ostomy supplies include disposable stoma-measuring guides in each box of pouches. These guides are used to determine the size of a round stoma. An opening that clears the stoma and minimizes exposure of the peristomal skin should be selected. For irregularly shaped stomas, it is necessary to make a pattern that can be used to size the barrier or pouch opening. One simple way to make a pattern is to use a transparent piece of plastic and a felt-tipped marker to trace the contours of the stoma. The pattern is then cut out and altered as necessary until a good fit has been obtained. The pattern should be labeled with arrows indicating "head" and "foot" and "pouch side" and "skin side." When a

barrier is added to an adhesive pouch, the barrier is sized to fit closely around the stoma without impinging on the bowel mucosa; the pouch is sized to clear the stoma by at least 1/8 in. This method prevents the rigid pouch opening from causing damage to the stoma; in addition, it prevents tunneling of the effluent between the barrier and the pouch.

Because edema decreases during the first 6–8 weeks after surgery, the size of the stoma decreases and the opening of the ostomy device must be resized at each pouch change during this period. Once shrinkage is complete, further resizing is not necessary unless the stoma changes. The condition of a patient who is not able to measure the stoma or who has an irregularly shaped stoma must be followed closely during the first 6–8 weeks after surgery, either by a home care nurse or through follow-up at an outpatient clinic.

Teaching and Counseling for Self-Care

The initial focus in patient teaching is on self-care skills and daily manage- ment issues, such as dietary alternations. Once these basic skills have been mastered, the focus shifts to how to incorporate the ostomy into the per- son's lifestyle. With decreasing length of stay in hospital, this is often be- gun in the hospital and continued at home with a visiting nurse and/or during outpatient visits. Common concerns include bathing and clothing; management of the ostomy at

work, during exercise, in recreational activities and travel, and during sexual activity; and disclosure issues.

Fig 10. Stoma Apparatus

Bathing :

Patients may take a tub bath or shower with the pouch left on or taken off. They are encouraged to bathe with the pouch on unless it is time to change the pouch (routine bathing with the pouch off may result in inadvertent removal of the skin barrier paste or washing of the skin barrier wafer or ring, which in turn contributes to premature disruption of the pouch seal). The patient may choose to "picture frame" the edges of the pouch with waterproof tape to increase the resistance; the alternative is to pat the taped edges dry or to dry them with a hair dryer on a low setting.

Clothing :

Snug undergarments over the pouch help conceal the presence of the stoma. Pouch covers protect the skin from the plastic of the pouch and also serve to conceal the pouch contents. For patients with a flush or slightly protrud- ing stoma located in the lower abdominal quadrants, these measures are usually sufficient to conceal the stoma and allow preoperative clothing to be worn. Clothing modifications usually are minimal for these patients; for example, patients may wear slacks or skirts that have front pleats or are loose-fitting. Women are instructed that pantyhose and stretch panty girdles are permissible. Regular girdles may also be worn provided that the stays do not cross the stoma. Bathing suits are available that effectively conceal the stoma; women are advised to look for

patterned suits with shirring or draping. Patients should also be made aware of speciality underclothing designed for the person with an ostomy.

Fecal Diversions :

When the distal bowel segment remains intact—as with a loop stoma, a double-barrel stoma, or an end stoma with Hartmann's pouch—the patient must be prepared for temporary output of stool per rectum once peristalsis returns. The distal bowel continues to produce mucus, and the patient may periodically feel rectal fullness and the need to evacuate the accumulated mucus. Patients who sense rectal distention but are unable to expel the mucus may benefit from a low-volume rectal enema to flush out the mucus.

The patient who has a double-barrel ostomy must be taught how to manage the nonfunctioning "mucous fistula" stoma. If the distal mucous fistula stoma is immediately adjacent to the proximal functioning stoma, it should be included in the pouch. If the nonfunctioning stoma is located at a distance from the proximal stoma, it can be managed with a light dressing, changed by the patient either daily or as needed, or with a stoma cap or cover.

Discharge Planning :

Discharge planning is critical for the patient with an ostomy. As the length of stay after ostomy surgery has shortened, the time available for teaching and

counseling has also decreased. The teaching focus during the postoperative phase must be survival skills—that is, pouch emptying and pouch changing procedures. Much additional teaching and counseling are required to support integration of the ostomy into the patient's lifestyle. All patients should have access to outpatient follow-up on a regular basis. In addition to such follow-up, many patients need home health care after discharge. The home care nurse can provide reinforcement and support for self-care and additional instruction regarding ostomy management and counseling regarding psychosocial issues. The ET nurse who provides instruction should evaluate the ostomy patient's potential need for home care follow- up and should initiate or contribute to the referral. It is frequently beneficial to contact the home care nurse and provide that professional with additional information regarding the patient's care.

Support Groups :

Many patients and families benefit from support groups such as the United Ostomy Association, Crohn's and Colitis Foundation of America, and the American Cancer Society. Advice, information, and support from people living the experience can be invaluable to patients

2.8 COMPLICATIONS OF STOMA

Metabolic Problems :

The normal output from an ileostomy is approximately 800 mL/day. In the immediate postoperative period, the volume may be much higher because of partial obstruction caused by edema of the stoma. In the established stoma a bacterial or viral gastroenteritis commonly increases the output and may require intravenous fluid replacement until the volume of output diminishes. Chronic losses of electrolytes may alter the ratio of chemicals and predispose the patient to the precipitation of stones in the kidneys and gall- bladder. If resection of an appreciable length of distal ileum has occurred, the possibility of a vitamin B_{12} deficiency must be considered.

Necrosis :

Necrosis occurs because the terminal portion of the bowel has been deprived of an adequate blood supply. In the construction of an end ileos- tomy, the mesentery may be detached from the bowel for 5 cm without causing ischemia. The blood supply to the terminal ileum is transmitted through the submucosa. In a patient with a thin abdominal wall, 5 cm is sufficient to construct a viable stoma and allow eversion of the bowel for nipple construction. Ischemia is readily recognized. In the postoperative period, if there is any doubt about whether a dusky color change is congestion or ischemia, a pinprick will clarify the issue. If the stoma is ischemic,

it will have to be revised at laparotomy. If the level of ischemia is above the level of the fascia, the revision can be done at a convenient time. How- ever, if there is no identifiable level of demarcation superficial to the fascia, laparotomy should promptly be performed. In obese patients, even moderately obese ones, construction of an end ileostomy may result in compromising viability and/or having the nipple protrude above skin level. Construction of a loop end ileostomy as described by Turnbull and Weakley allows the creation of a viable stoma with a nipple valve that looks and functions as an end ileostomy. In extremely obese individuals, fashioning even a loop end ileostomy may be difficult. The small intestine must be mobilized and a generous incision (8–10 cm) made in the rectus muscle to allow the stoma to be delivered through the skin aperture. When the surgeon is satisfied with the length of the stoma support by a rod, the defect in the muscle and fascia is closed cephalad and caudal to the bowel with interrupted nonabsorbable sutures. Closing the defect reduces or delays the development of a parastomal hernia.

Parastomal Abscess, Ulcer, and Fistula :

In the early postoperative period, considering the local environment, para- stomal abscesses are uncommon. When they do occur, they are related to revision or reconstruction of a stoma at the same site. An abscess, which is the result of an infected hematoma or a misplaced suture during maturation, requires surgical drainage. When an abscess develops at a mature stoma, it is usually the result of folliculitis or recurrent Crohn's disease in an ileostomy. At a colostomy, an abscess usually results from perforation of the intestine with an enema tip during attempted irrigation. A parastomal abscess must be drained if it has not drained spontaneously. An ileoscopy or stoma injection is performed to investigate the cause of the abscess and to determine whether a fistula is present. If no fistula is present, the cause is invariably folliculitis. The abscess may be drained, but it will not heal un- less the cavity is unroofed by excising the undermined skin. Re-epithelization then will occur. If the unroofed area is small (≤2 cm in diameter), the ulcer is managed with a small piece of nonadhesive dressing placed under the conventional ostomy management system and changed daily until it heals.

Parastomal Hernia :

Parastomal hernias are relatively uncommon with ileostomies; the reported incidence varies between 0.7 and 2.6%. These hernias are more common with colostomies, with occurrences reported as between 3 and 10% of patients. Predisposing conditions are obesity, a large abdominal wall aperture, placement of the stoma lateral to the rectus sheath, and weakness of the abdominal wall from age or multiple incisions. Parastomal hernias generally enlarge and may cause an unsightly bulge under clothing. If untreated, these hernias may enlarge and make it difficult to keep an ostomy management system attached. If a rigid face plate is used, pressure necrosis may result from tightening the belt to keep the system attached. Less rigid ostomy management systems, such as those with a pectin-based skin barrier, make this complication less likely. Smaller, asymptomatic hernias can be managed by using a Velcro binding with an opening cut for the pouching system. The indications for surgery are difficulty with pouch application or with irrigation of the colostomy.

Surgery is most satisfactorily done by relocating the stoma, usually to the contralateral side. As a practical consideration, certain sites for relocating the stoma are less than optimal, and local repair may be preferable. Local repair is done at laparotomy. The orifice through the abdominal wall is closed with interrupted nonabsorbable sutures. In a survey of patients at the Cleveland Clinic, the cumulative probability of recurrence was 46% after 6 years. Obesity was the only clinical factor investigated that significantly predisposed patients to recurrence of the hernia.

Stricture :

It is still thought by some individuals that stomas need to be dilated after construction to prevent stricture formation. This idea originated when stomas were not matured primarily. When stomas are constructed correctly and matured primarily, there is no reason for "dilatation" of the stoma. This practice is not only uncomfortable and unnecessary but can also cause strictures from the scarring that develops as a result of the repeated trauma caused by the dilatation.

If a stricture develops as a result of ischemia or recurrent prestomal Crohn's disease, revision is necessary. Such revision may be done locally, but recurrent Crohn's disease usually requires laparotomy and resection of the terminal ileum.

Volvulus :

Volvulus around an ileostomy is prevented by suturing the cut edge of the mesentery of the small bowel to the anterior abdominal wall. This method closes the mesenteric defect, preventing the small bowel from rotating on the axis of the mesentery of the stoma. A volvulus may occur around a loop ileostomy where the mesentery is not divided; however, such an occurrence is uncommon, and it is not practical to attempt to close the mesenteric defect. We have seen three instances of volvulus around loop ileostomies during the latter half of pregnancy, possibly related to a change in the location of the small intestine. Volvulus is manifest as an obstruction involving congestion of the stoma. Laparotomy is indicated to alleviate this condition.

Caput Medusae :

Caput medusae is a circumferential burgundy halo around a stoma that blanches with pressure. It is the result of a portosystemic collateral circulation from portal hypertension. The underlying cause is cirrhosis caused by sclerosing cholangitis. Bleeding, the resulting complication, occurs at the mucocutaneous junction and may be profuse. Immediate control of the bleeding can be obtained by applying pressure precisely to the bleeding point. The bleeding will stop if there is no coagulopathy, as may occur with cirrhosis. Repeated episodes of bleeding should prompt surgical treatment. Such treatment involves interrupting the portosystemic circulation by separating the mucocutaneous junction. The collateral circulation is located at this level. It is not necessary to mobilize the stoma completely down into the peritoneal cavity. Some of the vessels to be interrupted have a large caliber and require individual ligation. Blood loss may be more than expected if the portal pressure is high. Because of the pathophysiology of the caput medusae, recurrence is inevitable. Portosystemic shunting surgically or via transjugular intrahepatic portosystemic shunt (TIPS) may be indicated. Sclerotherapy has

been proposed as a treatment method, but those reported cases in which it was done required multiple injections and the effect was short-lived.

Obstruction :

In the early postoperative period, obstruction is caused by edema at the level of the new stoma. The obstruction may result in some abdominal cramping and liquid output caused by the excessive secretion of succus entericus. As the time from operation increases and the edema settles, so do the symptoms.

In a well-established ileostomy, an adhesive bowel obstruction may occur (as after any abdominal operation). In specific relation to the stoma, obstruction caused by a food bolus needs to be considered. Direct questioning of the patient regarding recent ingestion of food with a high fiber content will given an indication of the probability of such obstruction. If the patient has been indiscreet and has eaten a large volume of high-fiber foods, it is likely that a bolus of undigested food is the cause of the obstruction. the point of obstruction occurs at the fascia level of the abdominal wall. Management involves ileostomy lavage. The lavage is performed by insert-

ing a 22 or 24F Foley catheter into the distal bowel and irrigating it with several 100-mL aliquots of saline. A two-piece pouching system or irrigation sleeve can be applied to manage the flow. If the catheter can be inserted into the stoma for several inches and irrigation with several aliquots does not produce a return of fluid containing particulate matter of undigested food, the obstruction should be considered more proximal, probably an adhesive bowel obstruction. Further attempts to relieve the obstruction by irrigation should be stopped. If the irrigation produces a volume of undi- gested fibrous material, the procedure is continued until the bolus is broken up and there is some evidence of spontaneous evacuation. Treatment of a bolus obstruction by lavage usually does not require admission to the hospital.

Mucosal Implants :

Mucosal implants are islands of mucosa that have lodged along suture tracts; they are avoided by using appropriate technique during stoma construction. During maturation of the stoma, the mucocutaneous sutures are placed through the dermal layers of the skin without entering the epidermis. If mucosal implants create a problem, it is from the mucus that they secrete

under the ostomy management system. The mucus reduces the adhesion of the pouch and causes leakage. It is not common for implants to cause a major problem, but if the implants are extensive, relocation of the stoma may be necessary. Precise destruction at skin level with a needle electrocautery will give temporary relief.

Trauma :

Trauma to the stoma may occur in body-contact sports, but this is uncommon because most patients with stomas avoid this type of activity. When the aperture in the pouching system is too small or misplaced, vigorous physical activity may result in a cut or a circumferential ulcer and bleeding. If the cut is deeper, a fistula or complete transection of the stoma can occur. In less severe cases modification of the pouching system will allow healing of the ulcer. At the Cleveland Clinic, McLeod et al. conducted a survey of patients with conventional ileostomies to determine which factors affected the health and quality of life of these individuals. It was found that the only significant item that had any effect on quality of life was the function of the ileostomy.

The most common reasons for stoma revision are technical errors and recurrent disease. Surgeons, in concert with ET nurses, must approach the construction of stomas with care and make every effort to minimize potential problems, both physical and psychosocial.

Fig 11. Complications of Stoma

2.9 CLOSURE OF STOMA

Criteria for temporary ileostomy/colostomy closure:

- Integrity of distal bowel should be normal and adequate.
- Anorectal sphincter should be normal.
- Cause for construction of ileostomy/colostomy is cured completely without any suspicious of recurrence of same disease distally.

Two types of closure are present—extraperitoneal and intraperitoneal type. Now intraperitoneal closure is done. Earlier extraperitoneal closure was done in loop colostomy or ileostomy by placing a spur in between and closing the antimesentric part of the colon. It prevents the peritoneal contamination. But inadequate closure, leak, adhesions are the problems.

Intraperitoneal closure—commonly advocated technique now, is done by placing a circumferential incision over the margin with skin edge. Incision is deepened to enter the peritoneum and pull out the colostomy stoma. Part adjacent to the skin is resected and anastomosed using silk/vicryl. Sutured bowel is placed into the peritoneal cavity. Drain is placed into the peritoneal cavity. Abdomen is closed in layers.

Closure of colostomy/ileostomy is done after proper bowel preparation, under general or spinal anaesthesia.

Proper postoperative care is important.

Patient should perform anal sphincter exercises to prevent sphincter atrophy and to maintain sphincter tone.

Chapter 3

MATERIALS AND METHODS

MATERIALS AND METHODS

3.1 Type of study : Prospective and Retrospective Observational Study

3.2 Study approval : Prior to commencement of this study - Thesis & Ethical Committee of Madras Medical College and Rajiv Gandhi Government General Hospital, chennai had approved the thesis protocol.

3.3 Place of study : Rajiv Gandhi Government General Hospital

3.4 Period of study : Duration starting from 01 Sep 2014 to 31 Aug 2015

3.5 Sample size : 75 cases

3.6 Selection of patients:

a) **Sampling method-** Purposive**.**

b) **Inclusion criteria-** Patients who undergo any stomas in emergency laparotomies

c) **Exclusion criteria - -**

a) Age < 18 yrs & > 60 yrs

b) Elective stomas surgeries

3.7 Study procedure:

Method of sampling was non-random, purposive. After admission short history was taken and physical examination was conducted on each patient admitted in surgery department with features suggestive of acute abdomen requiring emergency laparotomies. Baseline investigations, as routinely required, were done, followed by imaging studies. Patients were then explained about their disease process and the possible line of management. All the necessary information regarding the study was explained to the patients or their valid guardian. Informed written consent was taken from the patients or their guardian willing to participate in the study. Detailed history was taken from the study group to establish proper diagnosis. Thorough physical examination was done in each case. Data collection sheets were filled in by the investigator himself. All of the preoperative factors related to the patient were noted down in the data sheet. After proper evaluation and preparation, patients were taken up for surgery. Strict aseptic precautions were followed during the operation. Meticulous techniques were practiced as far as possible. The operation procedure and related peroperative factors were observed directly and recorded in the data collection sheet instantly. After completing the collection of data it was compiled in a systematic way.

3.8 Variables studied:

i. Age

ii. Sex

iii. Co-morbidities: COPD, jaundice, diabetes, obesity and malnutrition

iv. Chest Xray and Abdomen Xray

v. Ultrasonogram and CECT findings

vi. Types of operations

vii. Post Operative Complications

3.10 Ethical consideration

All the patients/ legal guardians were given an explanation of the study and about the investigative and operative procedures with their merits and demerits, expected results, and possible complications. If he/she agreed then the case had been selected for this study. The study did not involve any additional investigation or any significant risk. It did not cause economic burden to the patients. The study was approved by the institutional review board prior to commencement of data collection. Informed consent was taken from each patient/guardian. Data were collected by approved data collection form.

3.11 Data collection

Data were collected by pre-tested structured questionnaire. Data were collected from all the respondents by direct interview after getting informed written consent from them or from their legal guardian.

3.12 Data analysis

Data analysis was done both manually and by using computer. Calculated data were arranged in systemic manner, presented in various table and figures and statistical analysis was made to evaluate the objectives of this study with the help of Statistical Package for Social Science (SPSS).

CHAPTER 4

RESULTS

RESULTS

This descriptive and observational study was carried out to determine the prevalence of abdominal tuberculosis among patients undergoing emergency laparotomies for acute abdomen. Sixty patients fulfilling the inclusion criteria from Surgery department of Madras Medical College and Rajiv Gandhi Government General Hospital during the period of 1 September 2014 to 31 August 2015 were selected. All cases were evaluated clinically. Only essential investigations necessary for diagnosis and preoperative assessment were carried out before operations. All patients underwent surgery as warranted in their case. The patients of both sexes and different ages were included in the study. The results obtained are as follows.

Table 1 : Age and Sex Distribution of patients

Age / Sex	Male	Female	Total
18 - 29	9	4	13
30 - 39	10	6	16
40 - 49	17	10	27
50 - 59	15	4	19
Total	51	24	75

* Figures in parentheses indicates percentages

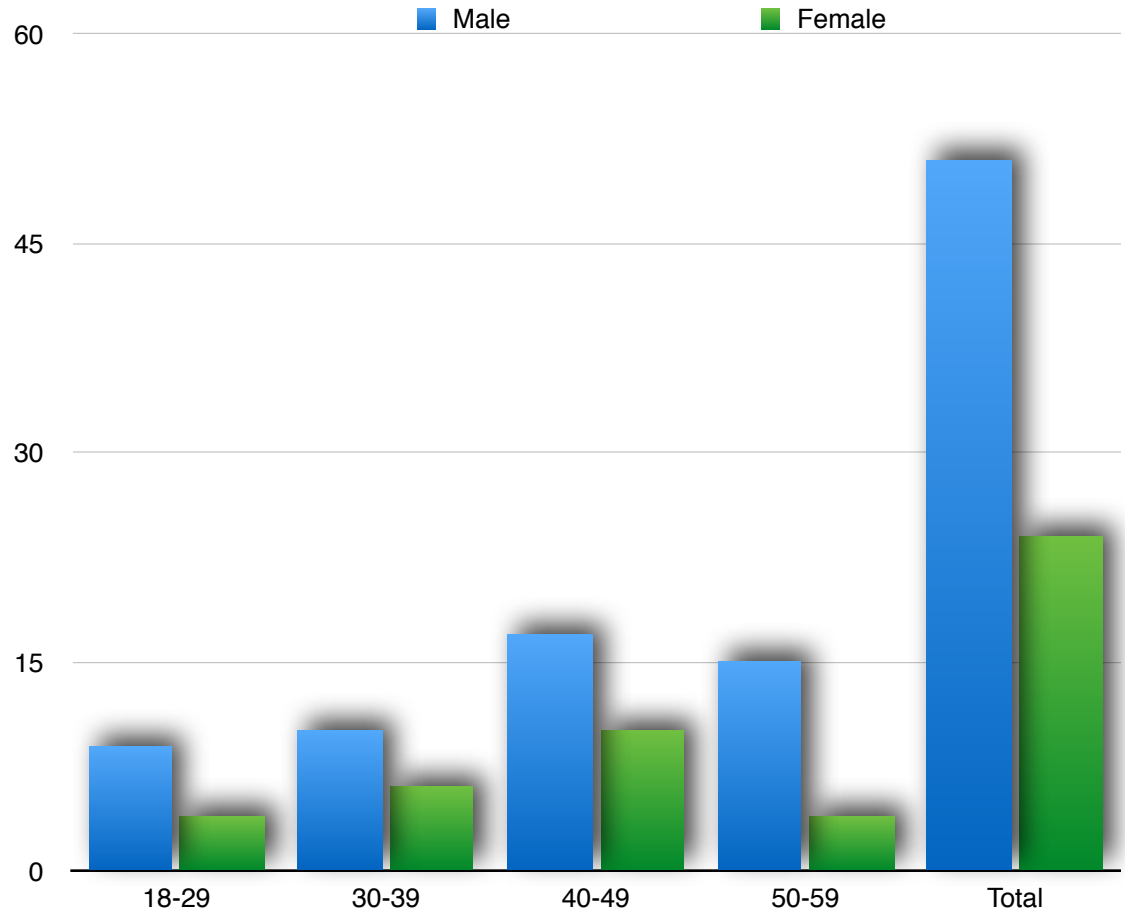


Table 2 : Prevalance of Comorbid Factors in patient group

Co Morbid Factor	Number	Percentage
Diabetes Mellitus	9	12
Hypertension	3	4
DM & HTN	2	2.67
TB / BA	5	6.67
CAD	2	2.67
CKD	1	1.33
No Comorbidity	53	70.67
Total	**75**	**100**

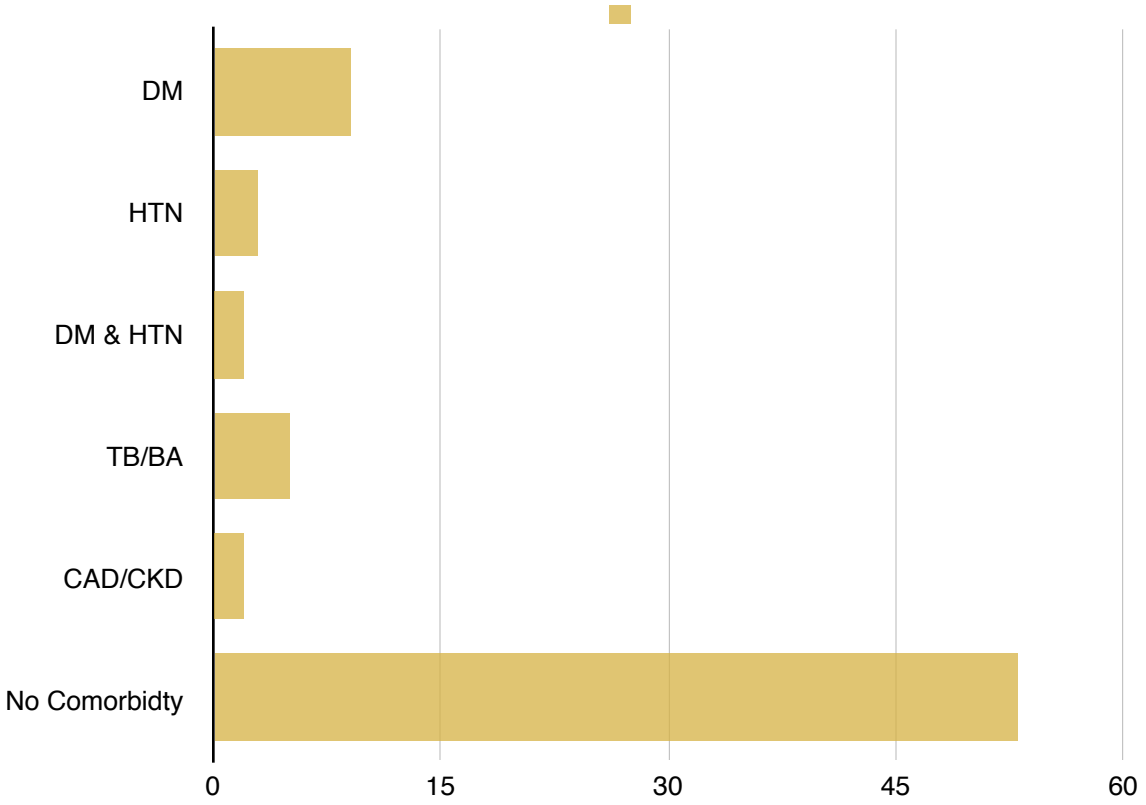


Table 3 : Diagnosis of patients who underwent emergency stomas

	Numbers	Percentage
Acute Intestinal Obstruction	8	10.67
Appendicular Pathology	2	2.67
Blunt Injury Abdomen	10	13.33
Penetrating Injury Abdomen	6	8
Carcinoma Colon	8	10.67
Small Bowel Perforation	22	29
Large Bowel Perforation	5	6.67
Sigmoid Volvulus	3	4
Obstructed Hernia	7	9.33
SMA Thrombosis	4	4.33
Total	**75**	**100**

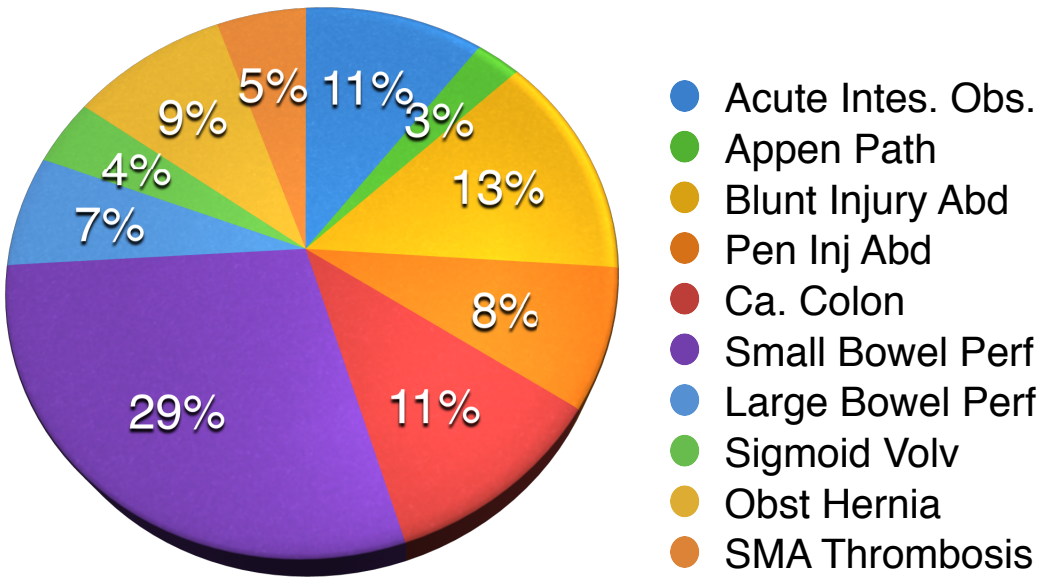


Table 4 : Analysis of Vital Parameters in patient group

Parameters	Within Range		Outside Range	
	Number	Percentage	Number	Percentage
SBP	39	53	36	48
PR	29	38.67	46	61.33
Hb	65	86.67	10	13.33
TC	48	64	27	36
Urea	44	58.67	31	41.33
Na +	69	92	6	8
K +	52	69.33	23	20.67

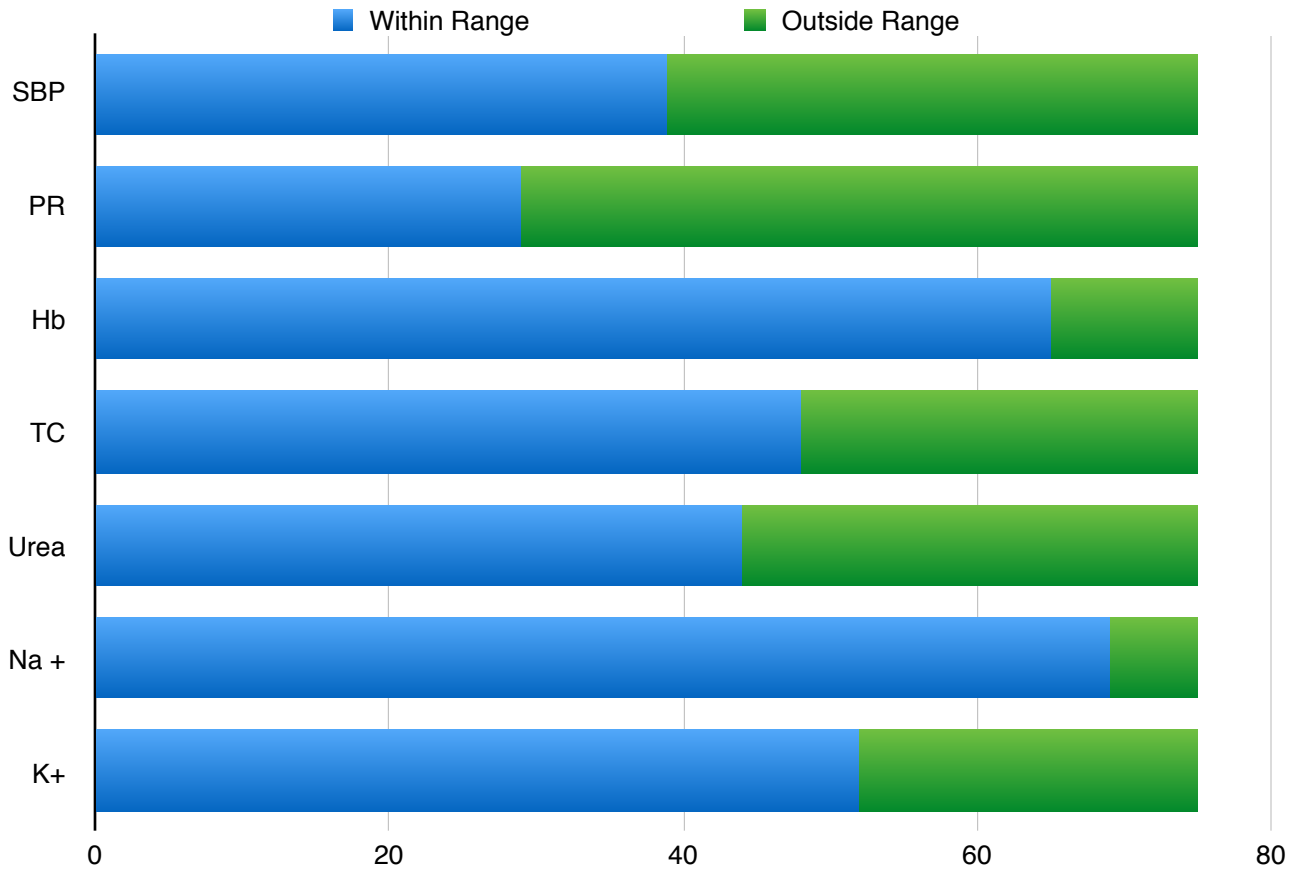


Table 5 : Intra Operative Findings in the patient group

		Numbers	Percentage
Obsrtuction		33	44
Perforation		42	56
Site	Small Bowel	44	58.67
	Large Bowel	31	41.33

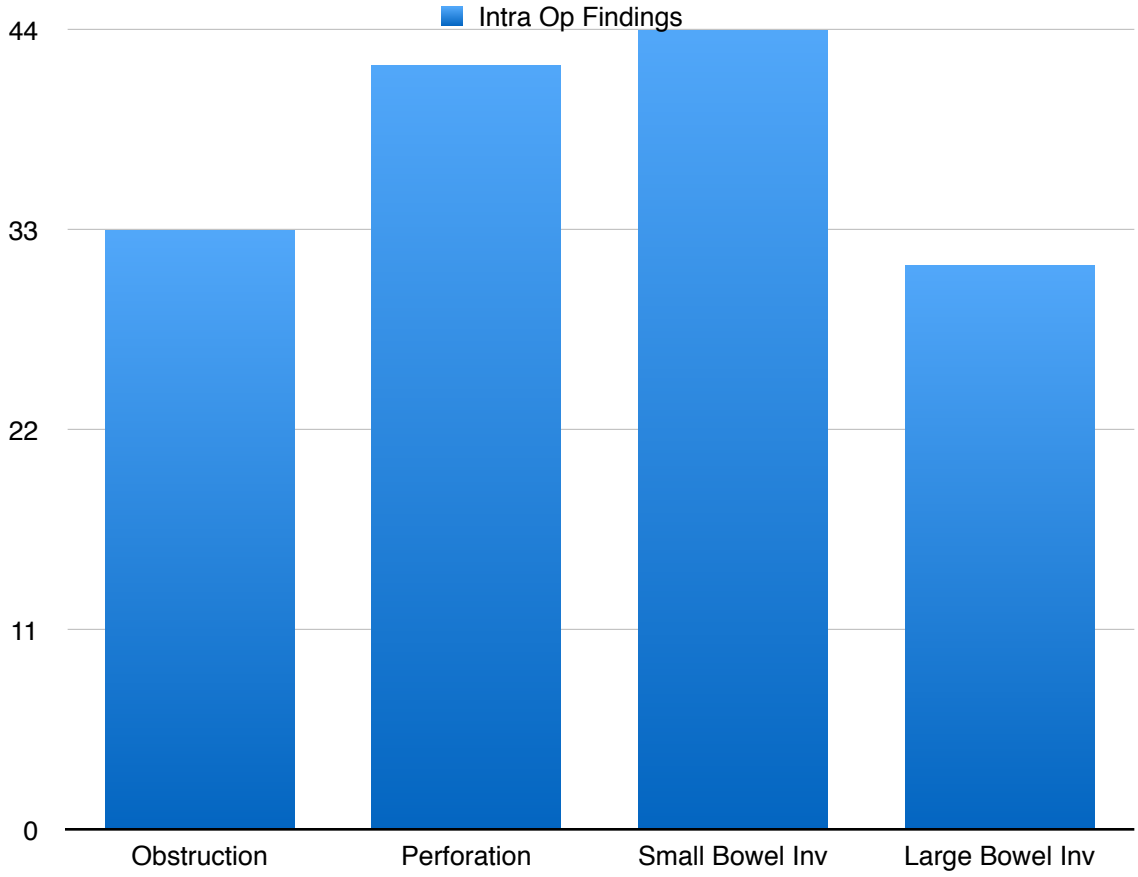


Table 6 : Distribution of Lag period and Duration of Surgery

		Numbers	Percentage
Lag Period	< 24 hours	22	29
	24 - 48 hours	21	28
	48 - 72 hours	11	15
	> 72 hours	21	28
Duration	1 - 2 hours	48	64
	> 2 hours	27	36

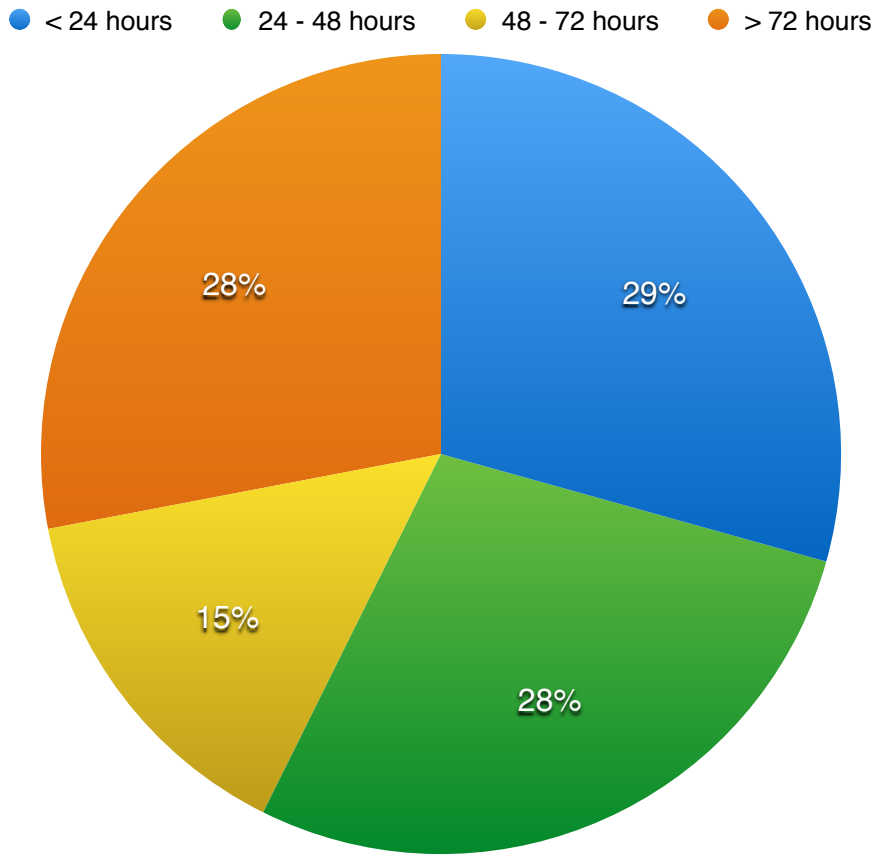


Table 7 : Distribution of causative factors

	Numbers	Percentage
Infection	15	20
Trauma	14	18.67
Malignancy	10	13.33
Misc	36	48
Total	**75**	**100**

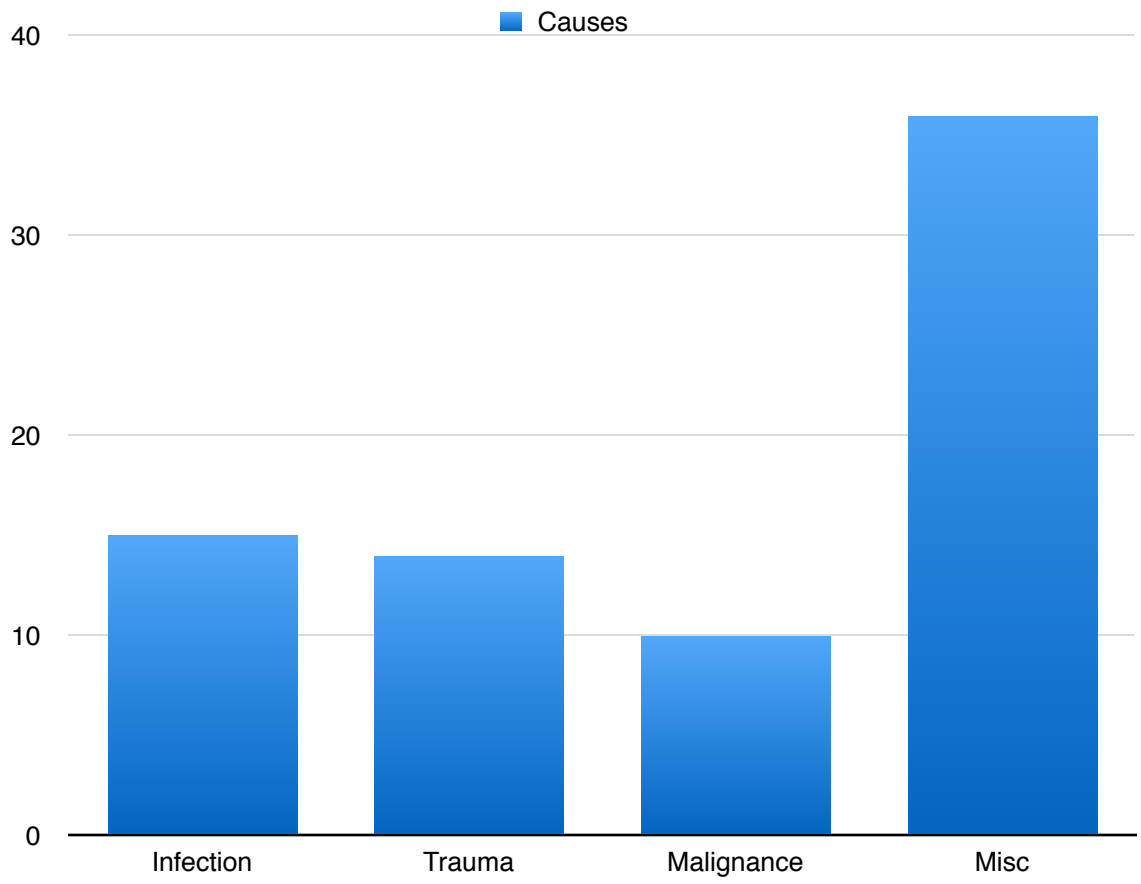


Table 8 : Distribution of Procedure underwent by patients in the Study

	Numbers	Percentage
Primary Closure with Loop Ileostomy	8	10.67
Resection & Anastomosis with Covering Stoma	21	28
End Ileostomy	10	13.33
Double Barrel Ileostomy	16	21.33
End Colostomy	15	20
Double Barrel Colostomy	5	6.67

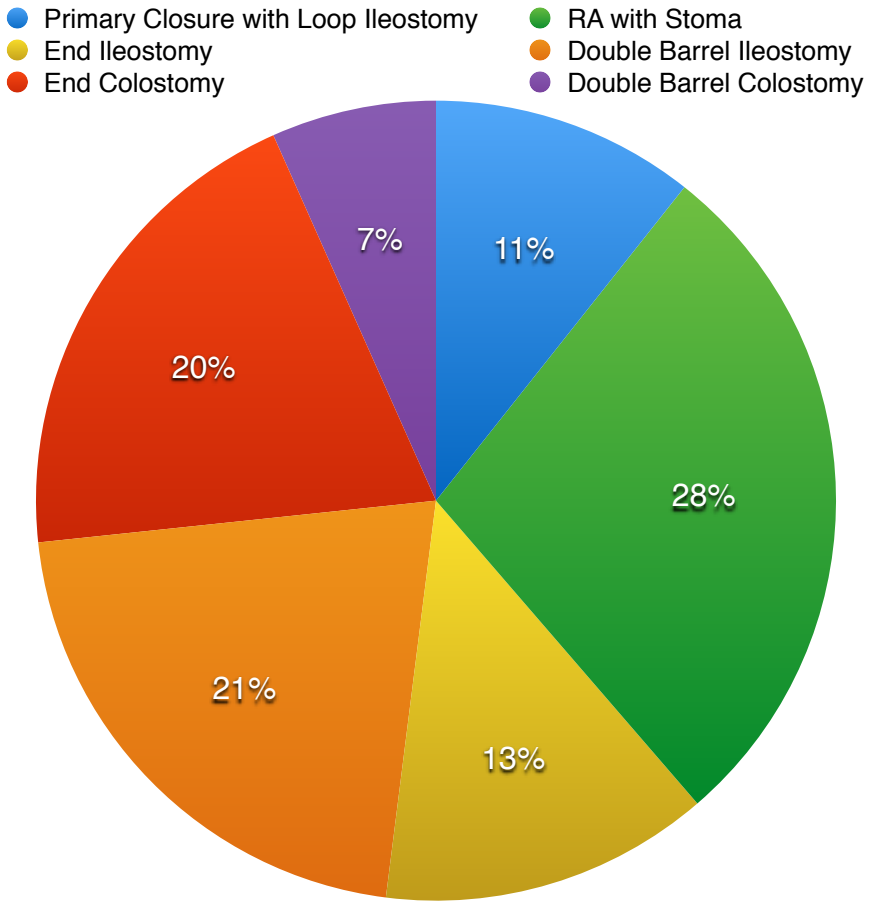


Table 9 : Reversal of Procedure

	Numbers	Percentage
Reversal Done	45	60
Reversal Not Done	30	40

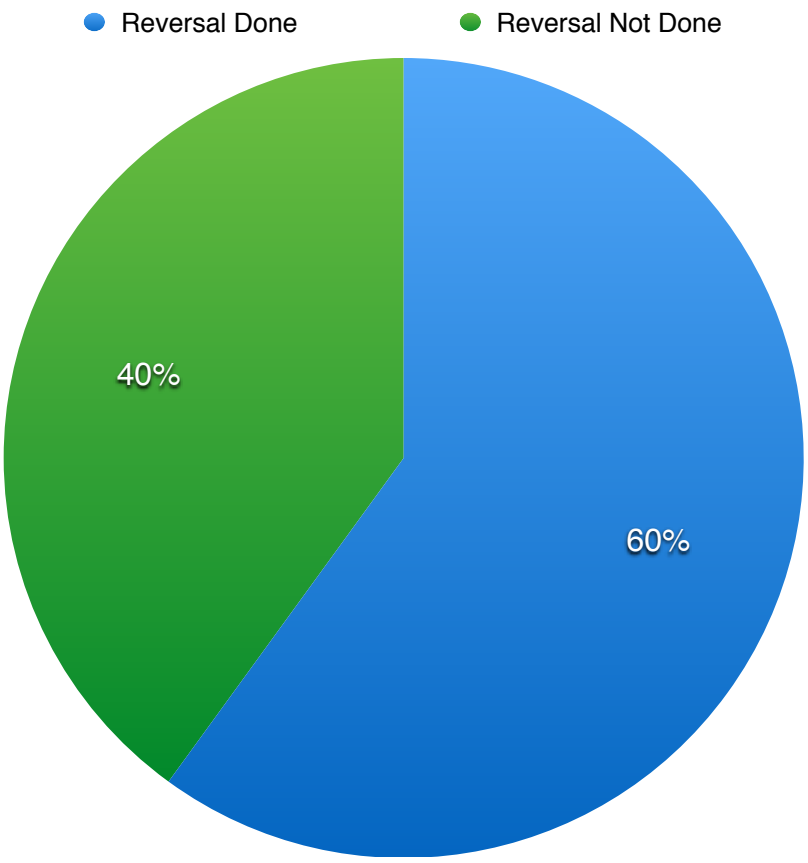


Table 10 : Prevalence of Morbidity among the patient group

	Numbers	Percentage
Acute Kidney Injury	3	4
Anastomotic Leak	3	4
Basal Atelectasis	5	6.67
Pulmonary Embolism	2	2.67
Dyselectrolytemia	12	16
Wound Dehiscence	8	10.67
Wound Infection	5	6.67
Deep venous thrombosis	2	2.67
No Morbidity	35	46.67
Total	**75**	**100**

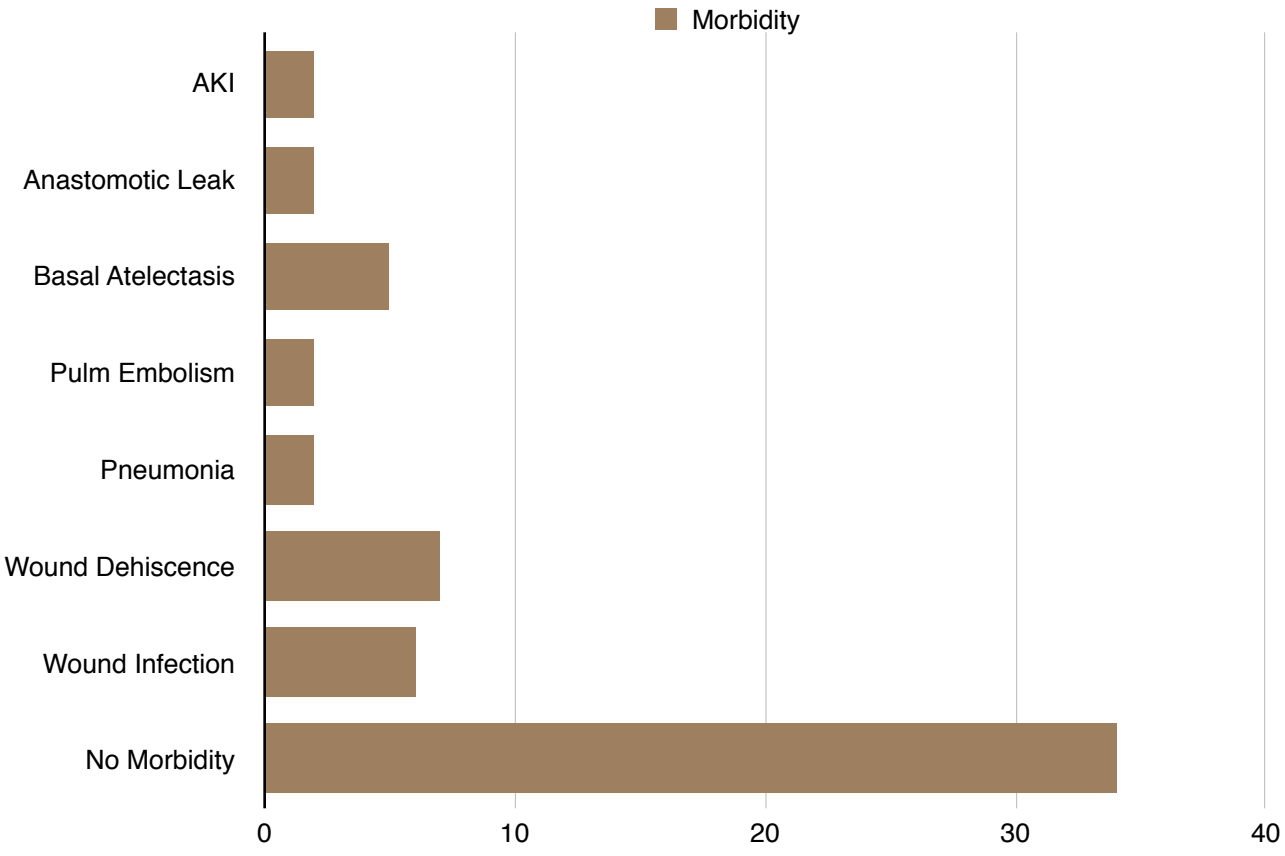


Table 11 : Prevalence of Mortality Among Patient Group

	Numbers	Percentage
MODS	7	9.33
ARDS	3	4
Sepsis	3	4
Alive	62	82.67
Total	**75**	**100**

Table 12 : Distribution of mortality and morbidity with cause

	Morbidity	Mortality
Infection	7	2
Trauma	11	1
Malignancy	5	1
Misc	17	9
Total	**40**	**13**

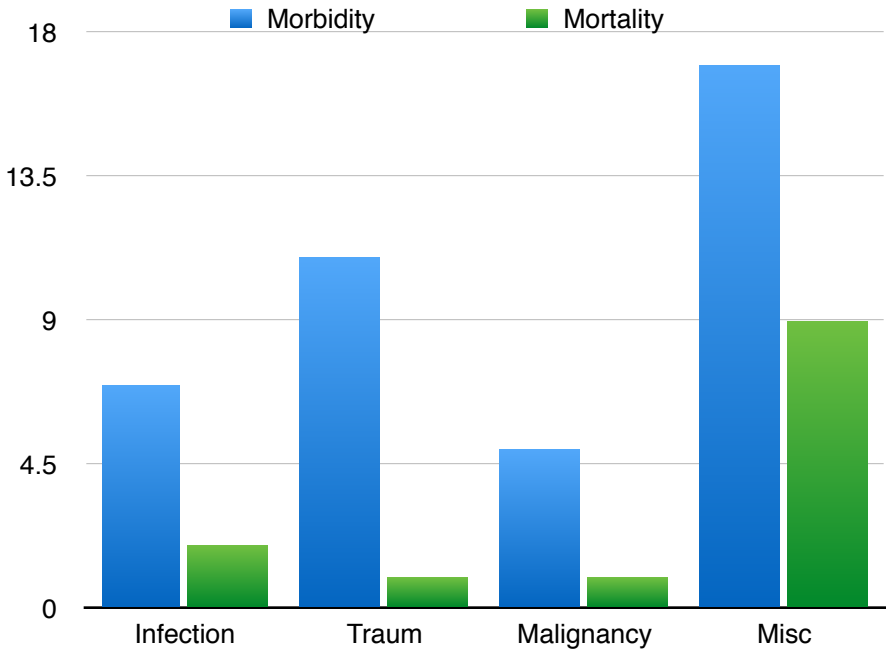
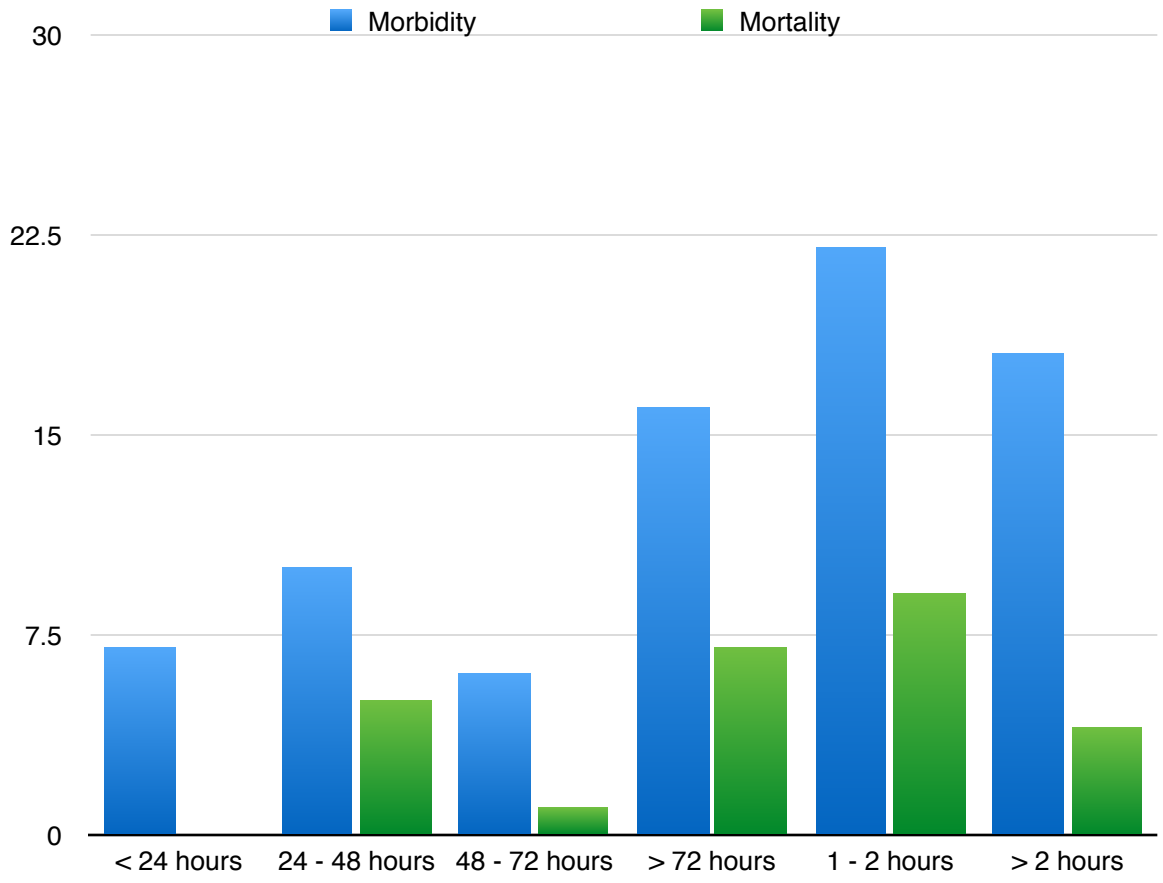


Table 13 : Distribution of Lag period and Duration of Surgery with Morbidity and Mortality

		Morbidity	Mortality
Lag Period	< 24 hours	7	0
	24 - 48 hours	10	5
	48 - 72 hours	6	1
	> 72 hours	16	7
Duration	1 - 2 hours	22	9
	> 2 hours	18	4



CHAPTER 5

DISCUSSION

DISCUSSION OF RESULTS

This descriptive and observational study was carried out to determine the causative factors for performing stoma in patients undergoing emergency laparotomies for acute abdomen and the associated morbidity and mortality. Seventy patients fulfilling the inclusion criteria from Surgery department of Madras Medical College and Rajiv Gandhi Government General Hospital during the period of 1 September 2014 to 31 August 2015 were selected.

Age of 75 patients ranged from 18-60 years. The patients were nearly equally distributed among all the age groups with slightly more preponderance in people over 40 years of age. The male to female ratio was ~ 2 : 1. So, it can be assumed that males are the predominantly involved group.

On analysing the comorbid factors, as expected, Diabetes Mellitus was the predominant comorbid factor, seen in 9 patients (13.3%), with systemic hypertension seen in three patients (5%). Other factors like CKD, CAD etc was seen in another eight patients

On evaluation of patients, eight patients presented with acute intestinal obstruction while sixteen people presented with trauma either blunt or penetrating. Small bowel perforation was the predominant reason for performing stomas in this

study with more than thirty percent of the patients undergoing stomas for the same. Obstructed hernia, Sigmoid Volvulus, Carcinoma Colon and SMA thrombosis with bowel gangrene being the other common indications for stomas in our study.

An analysis of the vital parameters, when the patient presented to the emergency department, showed that as expected more than 60% of patients had tachycardia while nearly forty patients had systemic hypotension. Elevated total count indicative of peritonitis was seen in twenty seven patients (36%) while evidence of pre-renal failure, indicated by elevated urea levels was seen in more than 40% of patients. Around twenty percent of the patients had electrolyte abnormalities.

Proceeding to intraoperative findings, thirty three patients had features of intestinal obstruction, due to either strictures, malignancy, volvulus or bowel adhesions. Forty patients presented with perforation. There was multiple perforation in nine patients. Small bowel involvement was seen in forty four patients while large bowel was involved in thirty one patients.

With regards to lag period between onset of symptoms and time of surgery, twenty nine percent of the patients had surgery within 24 hours, while twenty eight percent of patients were operated within 48 hours and fifteen percent were operated

on third day. More significantly, a huge number of around 28 percent had a more than seventy two hours delay since onset of symptoms before they underwent surgery.

Sixty four percent of the surgeries got over within two hours while the remaining thirty six percent took more than two hours.

An analysis of the causative factors showed that in fifteen cases infections like typhoid, TB causing perforations as the basic cause. Blunt or penetrating trauma to the abdomen is the cause in fourteen patients. Malignancy especially of the distal colon was the cause in ten patients. Miscellaneous causes including obstructed hernia, volvulus, appendicular pathology and SMV thrombosis accounted for the remaining thirty six patients.

Regarding the procedures performed, eight patients (10%) had primary closure of their ileal perforations, with twenty one patients having resection of the obstructed or perforated segment of ileum with anastomosis of the cut ends and a covering stoma. Another ten patients had resection with end ileostomy while sixteen patients had resections with proximal ileostomy and distal mucous fistula. Fifteen patients had end colostomy and 5 patients had a proximal colostomy with

distal mucous fistula.

Only forty five patients (60%) had a successful reversal of procedure. The remaining thirty patients (40%) who had not underwent surgery include thirteen patients who died and ten patients, who had malignancy and initial procedure was definitive, while seven patients were lost in follow up.

Forty patients developed post operative complications, most common being dyselectrolytemia seen in twelve patients (16%) with second most common cause being wound site involvement either in the form of wound dehiscence or wound infection. Pulmonary involvement was seen in seven patients which included, basal atelectasis and pulmonary embolism. Anastomotic Leak was seen in only three patients. Three patients had acute renal injury.

Thirteen patients died in the postoperative period. Seven due to MODS, three due to ARDS and three due to sepsis. Most of the morbidity and mortality was seen in the miscellaneous, mainly due to the presence of SMA thrombosis in that group. Morbidity was also high in the trauma group which is explained by the presence of other associated injuries but mortality was seen in only one patient.

LIMITATIONS OF THE STUDY

As this study has been carried out over a limited period of time with a limited number of patients and there was lack of financial and infrastructural support, it could not have been large enough to be of reasonable precision. The follow up period was not long enough to comment about long term morbidity and mortality. More number of patients with undergoing stomas need to be studied. All the facts and figures mentioned here may considerably vary from those of large series covering wide range of time, but still then, as the cases of this study were collected from a tertiary level hospital in our country, this study has some credentials in reflecting the facts regarding prevalence of stomal surgeries and its varied causes and complications associated with it.

SUMMARY

Abdomen trauma and acute peritonitis are the main cause of surgeries needing stoma in developing countries like India. It poses a great dilemma in decision making and the management protocols are also not defined. The increasing incidence of vascular anomalies in younger age groups and closed loop obstruction due to malignancies add to this burden. Moreover there is no clear cut data on the prognostic factors and the clinicoepediomology of the disease process. This study tries to throw a light on few of those factors

Age and Sex Distribution :

Malignant obstruction in older age groups form a significant proportion of cases whereas rheological abnormalities seen in middle age groups. The preponderance of male patients can be explained by the fact that by nature they are the predominant gender and greater involvement in motor vehicle accidents. The presence of additional risk factors like smoking, prevalence of immunocompromised status etc also shift the gender bias towards males

Co Morbid Factors :

Diabetes Mellitus is the prevalent comorbid factor, seen epecially in the elderly. Other comorbid factors include hypertension, bronchial asthma etc. None of these seemed to have a significant correlation with the disease process.

Management :

In emergency setting, midline laparotomy to relieve the patient of his

symptoms is the first goal. The common procedures performed included primary closure of perforation incase of small isolated perforations with not much contamination. Resection followed by either anastomosis or stomas was done in most of the patients with malignant obstruction or non viable or ischemic bowel. Even in those patients who had anastomosis, a covering stoma was placed as the healing process in these patients may be impaired.

Morbidity or Mortality :

The prevalence of morbidity in these patients were similar to any group of patients undergoing emergency laparotomy. The age predilection of morbidity towards elderly people is mainly due to significant proportion of malignant closed loop obstructions in this age group. Presence of a systemic disease, poor general habitus, inadequate optimization all have known to increase the tendency to develop post operative morbidity and mortality. Overall, prognosis is good in patients provided with early intervention, intensive post operative management while ensuring proper psychological support.

RECOMMENDATIONS

On the basis of the findings of the study, the following recommendations can be made:

- Abdomen injuries due to blunt and penetrating trauma and acute bowel pathologies leading to peritonitis such as bowel perforations are the leading causes needing stoma.
- More the lag period from the onset of symptoms/trauma to theatre, more is the incidence of stoma as anastomotic leakage is more common in this group.
- Post operative patient education and counseling is of utmost importance as there is no hope for prior sensitization in emergency settings
- Adequate hydration, electrolyte correction, nutrition management and psychological support teams play a crucial role in bringing significant number of patients for reversal.

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APPENDIX - I : ETHICAL COMMITTEE CLEAREANCE

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI-3

EC Reg No.ECR/270/Inst./TN/2013
Telephone No. 044 25305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To
Dr.R.Sethu Kannan
Postgraduate M.S.(General Surgery)
Madras Medical College
Chennai 600 003

Dear Dr.R.Sethu Kannan,

The Institutional Ethics Committee has considered your request and approved your study titled **"A study on Stomas in Emergency Laparotomies" No.09082015.**

The following members of Ethics Committee were present in the meeting held on 04.08.2015 conducted at Madras Medical College, Chennai-3.

1.	Prof.C.Rajendran, M.D.,	: Chairperson
2.	Prof.R.Vimala, M.D., Dean, MMC, Ch-3	: Deputy Chairperson
3.	Prof.Sudha Seshayyan, M.D., Vice-Principal, MMC, Ch-3	: Member Secretary
4.	Prof.B.Vasanthi, M.D., Professor Pharmacology, MMC	: Member
5.	Prof.A.Rajendran, M.S., Professor, Inst.of Surgery, MMC	: Member
6.	Prof.Saraswathy, M.D., Director, Inst. Of Pathology, MMC	: Member
7.	Prof.Srinivasagalu, Director, Inst.of Inter Med. MMC	: Member
8.	Tmt. J.Rajalakshmi, J.A.O. MMC, Ch-3	: Lay Person
9.	Thiru S.Govindasamy, B.A., B.L.,	: Lawyer
10.	Tmt.Arnold Saulina, M.A., MSW.,	: Social Scientist

We approve the proposal to be conducted in its presented form.

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

Member Secretary, Ethics Committee

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE
CHENNAI-600 003

Appendix-II

QUESTIONAIRE

PATIENT DETAILS:

Name: Age: Sex:

IP No. :

ON ADMISSION:

Main Complaints :

Abdominal Pain :

Vomiting :

Bowel Habits :

Co – Morbid Illness :

Significant Past History :

CLINICAL EXAMINATION:

Pulse : BP :

RR : Temp :

Pallor : Icterus :

CVS : RS :

P/A :

INVESTIGATIONS :

CBC : ESR :

Liver Function Test : Renal Function Test :

CXR :

Abdomen Xray :

USG Abdomen :

CECT Abdomen :

TREATMENT

OPERATIVE DETAILS :

Indication :

Intra Op findings :

Post op Period :

Biopsy (if done) :

Reversal of Stoma details (if done) :

FOLLOW UP :

INFORMATION SHEET

TITLE : **"A study on stomas in emergency laparotomies"**

Name of Investigator : Dr. Sethu Kannan R. Name of Participant :

Purpose of Research : The purpose of the study is to analyse the various causative factors for performing colostomy/ileostomy in emergency settings and the various factors affecting morbidity and mortality

Study Design : Prospective & Retrospective Observational Study

Study Procedures : Patient will be subjected to routine investigations, Xray, Usg, CECT Abdomen, Operative Procedure as indicated, Biopsy, if done and reversal of stoma, if done and the data analysed

Possible Risks : No risks to the patient

Possible benefits

To patient : A better understanding of their problem so has to devise a plan of management which suits their needs.

To doctor & to other people : The study can throw a light on the need for stomas, how to handle the post operative complications and the best time for reversal of stomas. This will help in providing better and complete treatment to other patients in future.

Confidentiality of the information obtained from you : The privacy of the patients in the research will be maintained throughout the study. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared

Can you decide to stop participating in the study : Taking part in this study is voluntary. You are free to decide whether to participate in this study or to withdraw at any time

How will your decision to not participate in the study affect you : Your decision will not result in any loss of benefits to which you are otherwise entitled.

Signature of Investigator Signature of Participant

Date :

Place :

PATIENT CONSENT FORM

Study Detail : **"A STUDY ON STOMAS IN EMERGENCY LAPAROTOMIES"**

Study Centre : Rajiv Gandhi Government General Hospital, Chennai.

Patient's Name :

Patient's Age :

In Patient Number :

Patient may check (☑) these boxes

I confirm that I have understood the purpose of procedure for the above study. I have the opportunity to ask question and all my questions and doubts have been answered to my complete satisfaction. ❑

I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving reason, without my legal rights being affected. ❑

I understand that sponsor of the clinical study, others working on the sponsor's behalf, the Ethics committee and the regulatory authorities will not need my permission to look at my health records, both in respect of current study and any further research that may be conducted in relation to it, even if I withdraw from the study I agree to this access. However, I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from this study. ❑

I agree to take part in the above study and to comply with the instructions given during the study and faithfully cooperate with the study team and to immediately inform the study staff if I suffer from any deterioration in my health or well being or any unexpected or unusual symptoms. ❑

I hereby consent to participate in this study ❑

I hereby give permission to undergo complete clinical examination and diagnostic tests including hematological, biochemical, radiological tests and to undergo treatment ❑

Signature/thumb impression

Patient's Name and Address:

Signature of Investigator

Study Investigator's Name:

Dr. SETHU KANNAN R.,

Appendix – III

Statistical formula

A. Sample size:

To determine the sample size, this formula was used; $n = \frac{z^2 pq}{d^2}$

Where,

n = the desired sample size,

z = the standard normal deviate, usually set at 1.96 at 5% level,

which corresponds to 95% confidence level,

p = proportion of population, q

= 1- p

d = the degree of accuracy level considered as 5.0 %,

which assumes 0.05

If population size, N < 10,000 than the required sample size is very much smaller which was calculated by the following formula –

$$n_f = \frac{n}{1 + \frac{n}{N}}$$

Where,

n_f = the desired sample size, when population size, N < 10,000

n = the desired sample size, when population size, N > 10,000 N

= the roughly estimated population size.

B. Arithmatic mean, $X = \frac{\sum fx}{N}$ (for grouped data)

C. Standard deviation , $SD = \sqrt{\frac{\sum (X - \bar{X})^2}{}}$

('O' indicates observed value and 'E' indicates expected value)

D. $$Z = \frac{P_1 - P_2}{\sqrt{\left[\frac{P_1 Q_1}{N_1} + \frac{P_2 Q_2}{N_2}\right]}}$$

P_1 indicates proportion in first group

P_2 indicates proportion in second group

$Q_1 = 100 - P_1$

$Q_2 = 100 - P_2$

N_1 indicates sample size of first group

N_2 indicates sample size of second group.

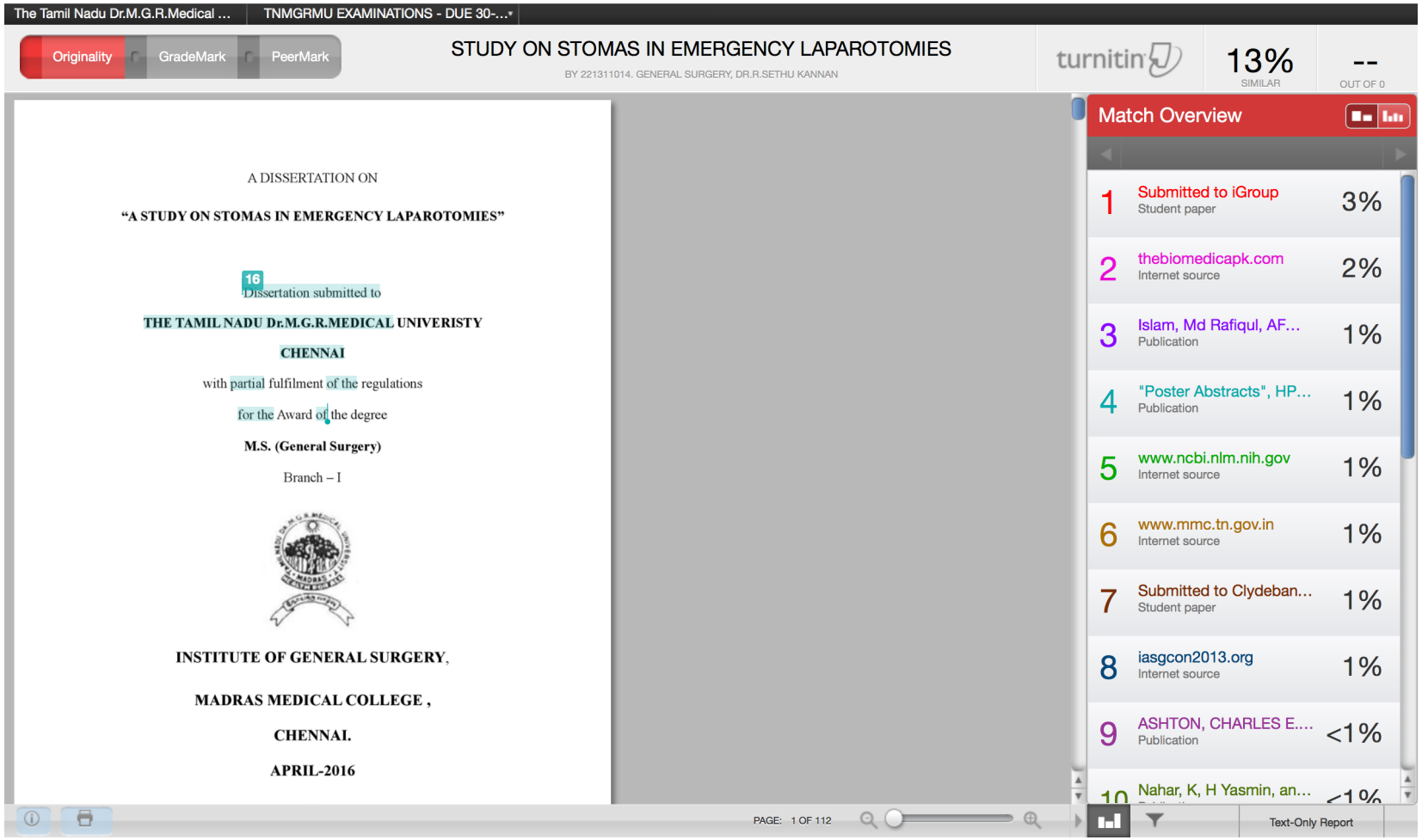
E. $$SD = \sqrt{\frac{\sum (X - \bar{X})}{(N-1)}}$$

Here, $\bar{X}$ indicates mean value

X indicates individual value

N indicates sample

APPENDIX IV - - PLAGIARISM



APPENDIX V — MASTER CHART

S. No.	Name	Age	Sex	Co-Morbidity	Diagnosis	SBP	PR	GCS	Hb	TC	Urea	Na+	K+	Diagnosis							Lag Period	Duration of Surgery	Operative Procedure	Reversal of Procedure	Post op Comp	Cause of Death
														Obst	Perf	Site	Inf	Tra	Malig	Misc						
1	Amudha	38	F	-	blunt abdomen injury	90	128	15	10.6	6,800	7	145	4.7	-	+	Ileal	-	+	-	-	<24 hrs	1-2hrs	PC with LI	+	-	-
2	Krithika	24	F	-	ileal perforation	110	132	15	11	13,800	8.3	139	4.3	-	+	Ileal	Ty	-	-	-	<72 hrs	>2hrs	PC with LI	+	WI	-
3	Sharmila shri	55	F	DM	ileal stricture	140	72	15	11	21,000	11	133	3.8	-	+	Ileal	TB	-	-	-	>72hrs	>2hrs	Res with EI	+	At	-
4	Munusamy	32	M	-	penetrating injury abdomen	90	124	13	13	9,700	12	129	4.4	-	+	TC	-	+	-	-	>72hrs	>2hrs	Res with DC	+	WD	-
5	Rajesh	18	M	-	appendicular perforation	100	96	15	12	11,800	6	139	4.5	-	+	IC	-	-	-	+	<48hrs	1-2hrs	RA with LI	+	-	-
6	Sujatha	32	M	-	sigmoid volvulus	110	99	15	13.2	9,800	11.3	140	3.3	+	-	SC	-	-	-	+	<24 hrs	1-2hrs	Res with EC	+	-	-
7	Kalaiselvi	52	F	DM	ileal perforation	110	106	15	9.2	9,000	8	135	4.1	-	+	Ileal	-	-	-	+	<24 hrs	1-2hrs	Res with DI	+	-	-
8	Gokul	48	M	-	Ca rectum	110	68	15	11.9	5,500	8	129	3.1	+	-	Rectum	-	-	+	-	<48hrs	1-2hrs	Res with EC	-	DVT	-
9	Daniel	55	M	DM	acute intestinal obstruction	90	96	15	8.8	10,800	7.8	141	3.3	+	-	SC	-	-	+	-	>72hrs	>2hrs	RA with LC	+	AL	-
10	Ranjith	45	M	DM	ileal perforation	110	98	15	10.9	21,900	6	138	3.7	-	+	Ileal	Ty	-	-	-	<24 hrs	>2hrs	Res with DI	+	-	-
11	Inbaraj	56	M	-	SMA thrombosis	94	102	15	11.2	5,300	12	125	2.8	+	-	Ileal	-	-	-	+	>72hrs	1-2hrs	Res with EI	-	DE	MODS
12	Sundari	45	F	TB	multiple ileal strictures	110	86	15	10.8	22,400	6.5	138	4.2	-	+	Ileal	TB	-	-	-	<48hrs	1-2hrs	Res with DI	-	-	Sepsis
13	Yuvaraj	37	M	-	blunt abdomen injury	84	112	14	10.8	4,600	9	135	5.8	-	+	Jej	-	+	-	-	>72hrs	1-2hrs	Res with DJ	-	DE	MODS
14	Kayalvizhi	47	F	-	Ca anal canal	124	87	15	10.8	8,700	6.5	143	4.4	+	-	Rectum	-	-	+	-	<48hrs	1-2hrs	Res with EC	-	-	-
15	Selvi	38	F	DM	blunt abdomen injury	96	122	15	11.4	5,700	5.5	144	4.2	-	+	TC	-	+	-	-	<24 hrs	1-2hrs	RA with LC	+	WI	-
16	Mumtaz	39	F	-	blunt abdomen injury	114	102	15	12.6	5,200	6.2	133	3.6	-	+	Ileal	-	+	-	-	<48hrs	1-2hrs	RA with LI	+	At	-
17	Rajeshwari	38	F	-	sigmoid perforation	102	106	15	10.6	27,800	10	140	5.6	+	-	SC	-	-	-	+	<24 hrs	1-2hrs	RA with LC	+	WD	-
18	Savithri	42	F	-	penetrating injury abdomen	90	110	14	11.9	6,700	5.7	142	6	-	+	TC	-	+	-	-	>72hrs	>2hrs	Res with DC	-	WD	-
19	Karthik	48	F	-	ileal perforation	110	114	15	10.8	22,000	6.2	142	5.3	-	+	Ileal	TB	-	-	-	<48hrs	1-2hrs	RA with LI	+	-	-
20	Ashok	29	M	-	blunt abdomen injury	104	122	15	11.8	8,000	7	136	3.8	-	+	SC	-	+	-	-	<72 hrs	1-2hrs	Res with EC	+	At	-
21	Sudhakar	44	M	DM/HTN	obstructed inguinal hernia	110	75	15	12	5,800	7.2	140	4.2	+	-	Jej	-	-	-	+	>72hrs	1-2hrs	Res with DJ	-	DE	MODS
22	Saranya	38	F	-	sealed ileal perforation	122	108	15	11.4	23,500	8	139	5.4	-	+	Ileal	-	-	-	+	<24 hrs	1-2hrs	LI	+	-	-
23	Loganathan	25	M	-	penetrating injury abdomen	130	110	12	14	9000	10	138	3.9	-	+	Ileal	-	+	-	-	>72hrs	1-2hrs	Res with DI	+	WI	-
24	Jyothi	45	F	-	Ca colon	130	98	15	10	5,500	12	144	4.2	+	-	DC	-	-	+	-	<48hrs	1-2hrs	Res with EC	-	-	-
25	Siva	55	M	CKD	penetrating injury abdomen	110	102	15	13	12,800	9	141	3.5	-	+	TC	+	-	-	-	<72 hrs	>2hrs	RA with LC	-	DE	-
26	Selvi	42	F	-	sigmoid perforation	120	80	15	10.2	9,800	7	140	3.9	-	+	SC	-	-	-	+	>72hrs	>2hrs	Res with EC	+	At	-
27	Raja	45	M	-	acute intestinal obstruction	100	97	15	13	11,800	11	137	3.3	+	-	TC	-	-	-	+	<72 hrs	1-2hrs	Res with DC	-	-	ARDS
28	Niranjan	56	M	-	Ca colon with obstruction	90	104	12	10.2	13,300	10	133	3.5	+	-	SC	-	-	+	-	>72hrs	>2hrs	Res with EC	-	WD	-
29	kaniappan	52	M	-	ileal perforation	90	110	14	12	5,800	6	135	3.9	-	+	Ileal	Ty	-	-	-	<24 hrs	>2hrs	PC with LI	+	-	-
30	Palanisamy	51	M	-	Ca colon with obstruction	110	104	15	14	5,600	10	139	4.4	+	-	SC	-	-	+	-	>72hrs	>2hrs	Res with EC	-	-	-
31	Aarmugam	27	M	BA	ileal perforation	90	112	15	13	12,500	9	133	5.2	-	+	Ileal	Ty	-	-	-	<24 hrs	>2hrs	PC with LI	+	DE	-
32	Ragunath	57	M	TB	acute intestinal obstruction	94	104	15	11	8,700	12	140	5.1	+	-	Ileal	TB	-	-	-	<24 hrs	1-2hrs	RA with LI	+	-	-
33	Prabhakar	33	M	-	ileal perforation	110	95	15	14	6,900	9	138	3.9	-	+	Ileal	Ty	-	-	-	<48hrs	1-2hrs	Res with DI	+	-	-
34	Pandian	55	M	HTN	obstructed incisional hernia	130	87	15	14	7,800	15	133	3.4	+	-	Ileal	-	-	-	+	>72hrs	>2hrs	Res with EI	-	DE	MODS
35	Monisha	23	F	-	blunt abdomen injury	90	106	15	11	13,600	11	139	4.4	-	+	Ileal	-	+	-	-	<72 hrs	1-2hrs	RA with LI	+	WD	-
36	Bhaskar	60	M	-	acute intestinal obstruction	160	104	14	9.8	7,800	15	134	3.2	+	-	IC	-	-	-	+	<48hrs	1-2hrs	Res with EI	-	-	ARDS
37	Singaravelan	55	M	-	sigmoid volvulus	90	98	15	10	6,600	11	138	3.8	+	-	SC	-	-	-	+	>72hrs	1-2hrs	Res with EC	-	-	-
38	Logesh	22	M	-	blunt abdomen injury	96	110	15	12	5,400	8	135	4.3	-	+	DC	-	+	-	-	<72 hrs	1-2hrs	Res with DC	+	WI	-
39	Anandan	24	M	-	ileal perforation	110	98	15	13	10,200	9	134	3.9	-	+	Ileal	-	-	-	+	<24 hrs	>2hrs	RA with LI	+	-	-
40	Prakash	45	M	-	ileal stricture	160	72	15	13	9,800	11	138	3.9	-	+	Ileal	TB	-	-	-	<48hrs	>2hrs	Res with DI	-	DVT	-

41	Sinnarasu	49	M	-	multiple ileal perforation	150	88	15	11	13,700	12	140	4.6	-	+	Ileal	-	-	-	+	<48hrs	1-2hrs	RA with LI	+	AL	-
42	Satish	45	M	-	caecal gangrene	130	94	15	13	12,800	9	139	3.3	-	+	IC	-	-	-	+	>72hrs	>2hrs	RA with LI	-	-	-
43	Munikrishnan	40	M	-	ileal perforation	130	90	15	13	12,800	10	138	3.9	-	+	Ileal	-	-	-	+	<72 hrs	1-2hrs	RA with LI	+	-	-
44	Chandrasekar	42	M	-	obstructed umbilical hernia	130	93	15	15	6,600	10	138	4.2	+	-	Ileal	-	-	-	+	<72 hrs	1-2hrs	RA with LI	+	-	-
45	Rajendran	52	M	CAD	SMA thrombosis	88	98	15	11	4,600	11	135	4.2	+	-	Jej	-	-	-	+	<48hrs	1-2hrs	Res with DJ	-	-	MODS
46	Vignesh	42	M	-	ileal stricture	120	72	15	13	8,600	6	139	3.9	-	+	Ileal	-	-	-	+	<48hrs	1-2hrs	RA with LI	+	-	-
47	Govindasamy	32	M	-	ileal perforation	110	92	15	13.6	8,700	5	142	3.6	-	+	Ileal	Ty	-	-	-	<24 hrs	1-2hrs	PC with LI	+	-	-
48	Premavathy	24	F	-	appendicular mass	130	72	15	12	11,200	6	138	4.2	+	-	IC	-	-	-	+	>72hrs	>2hrs	RA with LI	+	WD	-
49	Monisha	55	F	DM	Ca colon	110	72	15	10.9	6,600	10	133	3.4	+	-	DC	-	-	+	-	<24 hrs	1-2hrs	Res with EC	-	-	-
50	Mukesh	22	M	-	subacute intestinal obstruction	110	84	15	11.6	6,200	7	141	4.2	+	-	DC	-	-	-	+	<24 hrs	1-2hrs	Res with EC	+	-	-
51	Ramadass	40	M	-	blunt abdomen injury	120	92	14	13	7,200	6	136	3.9	-	+	TC	-	+	-	-	<24 hrs	1-2hrs	RA with LC	+	AKI	-
52	Sengalvarayan	34	M	BA	ileal perforation	136	99	15	12.5	24,000	6	137	5.2	-	+	Ileal	-	-	-	+	>72hrs	1-2hrs	Res with DI	-	DE	Sepsis
53	Mahalakshmi	52	F	CAD	acute intestinal obstruction	100	92	15	10.2	9,700	10.2	129	2.6	+	-	AC	-	-	+	-	<48hrs	1-2hrs	Res with EI	-	PE	-
54	Dayanidhi	54	M	-	penetrating injury abdomen	80	108	15	11.8	23,900	11	122	4.5	-	+	SC	+	-	-	-	<24 hrs	>2hrs	Res with EI	-	DE	-
55	Siva	38	M	-	blunt abdomen injury	74	132	13	7.2	9,800	10	128	6.2	-	+	TC	-	+	-	-	>72hrs	>2hrs	Res with DC	-	DE	Sepsis
56	Madurai	49	F	-	Ca rectum	120	68	15	11.4	7,600	6.5	142	3.9	+	-	Rectum	-	-	+	-	<24 hrs	1-2hrs	Res with EC	-	-	-
57	Lakshmi	56	M	DM	Ca anorectum	110	66	15	9.6	7,900	10	129	3.1	+	-	Rectum	-	-	+	-	<48hrs	1-2hrs	Res with EC	-	DE	-
58	Rajagopal	42	M	-	ileal perforation	82	126	15	11.2	18,600	9	149	3.2	-	+	Ileal	-	-	-	+	<48hrs	1-2hrs	Res with EI	+	WD	-
59	Lakshmi	42	F	-	acute intestinal obstruction	86	122	14	8.8	3,500	10.4	126	6	+	-	Ileal	TB	-	-	-	>72hrs	1-2hrs	Res with DI	-	DE	MODS
60	Nayana	22	F	BA	multiple jejunal perforation	88	118	15	8.6	22,000	11	130	5.5	-	+	Jej	-	-	-	+	<48hrs	1-2hrs	Res with DJ	+	-	-
61	Annapurni	45	F	HTN	obstructed incisional hernia	90	114	15	7.2	19,000	11.8	129	6.1	+	-	Ileal	-	-	-	+	<48hrs	>2hrs	Res with DI	-	PE	ARDS
62	Satish	35	M	-	penetrating injury abdomen	84	120	15	10.2	9,800	10	133	3	-	+	DC	-	+	-	-	<48hrs	>2hrs	RA with LC	+	-	-
63	mary	32	F	-	SMA thrombosis	80	98	15	9.6	8,200	9	145	5.3	+	-	Jej	-	-	-	+	>72hrs	1-2hrs	Res with DJ	-	AKI	MODS
64	Vishal	55	M	-	colonic perforation	100	114	15	12.4	22,700	11	142	3	-	+	SC	-	-	-	+	<72 hrs	>2hrs	Res with EC	-	WD	-
65	Vasugi	49	F	DM	sigmoid volvulus	144	98	15	9.6	5,600	8	123	6.1	+	-	SC	-	-	-	+	<24 hrs	>2hrs	Res with EC	+	At	-
66	Senthil	32	M	-	ileal perforation	90	116	15	10.4	24,500	9	129	5.6	-	+	Ileal	-	-	-	+	>72hrs	1-2hrs	Res with EI	-	WI	-
67	Palani	40	M	DM	obstructed inguinal hernia	124	87	15	10.8	8,700	6.5	143	4.4	+	-	Ileal	-	-	-	+	<24 hrs	>2hrs	RA with LI	+	-	-
68	Afsal	40	M	-	obstructed inguinal hernia	120	88	15	11.6	5,400	8	136	3.8	+	-	IC	-	-	-	+	<72 hrs	1-2hrs	Res with EI	+	-	-
69	Chelllappan	35	M	-	acute intestinal obstruction	114	82	15	13.5	4,600	7.2	137	3.8	+	-	IC	-	-	-	+	<48hrs	1-2hrs	RA with LI	+	DE	-
70	Rajappan	55	M	HTN	acute intestinal obstruction	132	98	15	13	23,500	11	130	2.9	+	-	Ileal	-	-	-	+	>72hrs	1-2hrs	Res with DI	+	-	-
71	Kadhar basha	42	M	-	ileal perforation	110	88	15	12.8	22,600	8	142	5	-	+	Ileal	Ty	-	-	-	<72 hrs	1-2hrs	Res with EI	+	-	-
72	Shanmugam	26	M	-	blunt abdomen injury	130	84	15	12.4	4,600	6	134	5.2	-	+	Ileal	-	+	-	-	<24 hrs	>2hrs	PC with LI	+	-	-
73	Arivazhagan	44	M	DM/HTN	SMA thrombosis	120	82	15	11.6	6,800	6.4	138	4.2	+	-	Ileal	-	-	-	+	<24 hrs	1-2hrs	Res with DI	+	AKI	-
74	Vinod	20	F	-	ileal perforation	110	82	15	12	6,500	5	140	4	-	+	Ileal	-	-	-	+	<48hrs	>2hrs	PC with LI	+	AL	-
75	Somasekar	46	M	-	obstructed inguinal hernia	110	72	15	11	4,600	8	140	4.1	+	-	Ileal	-	-	-	+	<24 hrs	>2hrs	RA with LI	+	-	-

KEY :

BA - - Bronchial Asthma
DM - - Diabetes Mellitus
SHT / HTN - - Systemic Hypertension
CKD - - Chronic Kidney Disease
CAD - - Coronary Artery Disease
TB - - Tuberculosis
SBP - - Systolic Blood Pressure
PR - - Pulse Rate
GCS - - Glasgow Coma Scale
Hb - - Hemoglobin
TC - - Total Count
Obst - - Obstruction
Perf - - Perforation
Inf - - Infection
Tra - - Trauma
Malig - - Malignancy
Misc - - Miscellaneous
PC with LI - - Primary Closure with Loop Ileostomy
RA with LI - - Resection anastomosis with Loop Ileostomy
RA with LC - - Resection anastomosis with Loop Colostomy
Res with EI - - Resection with End Ileostomy
Res with EC - - Resection with End Colostomy
Res with DI - - Resection with Double Barrel Ileostomy
Res with DJ - - Resection with Double Barrel Jejunostomy
Res with DC - - Resection with Double Barrel Colostomy
WI - - Wound Infection
WD - - Wound Dehiscence
At - - Basal Atelectasis
AL - - Anastomotic Leak
DE - - Dyselectrolytemia
DVT - - Deep Vein Thrombosis
MODS - - Multi Organ Dysfunction Syndrome
ARDS - - Acute Respiratory Distress Syndrome